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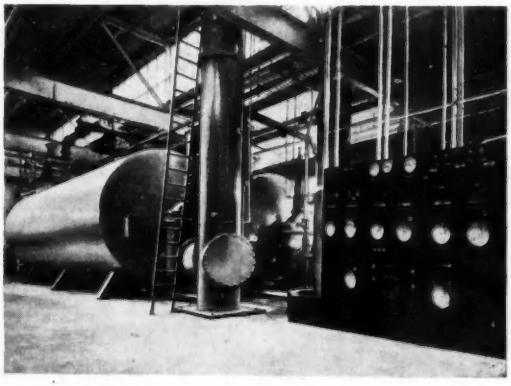

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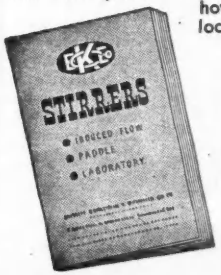

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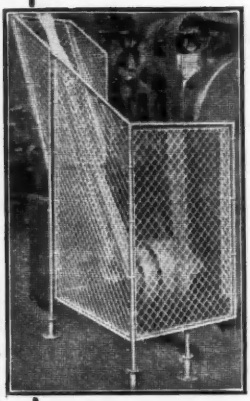

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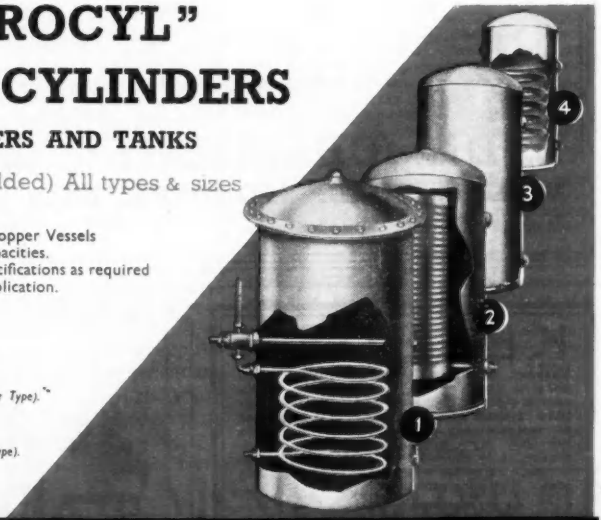

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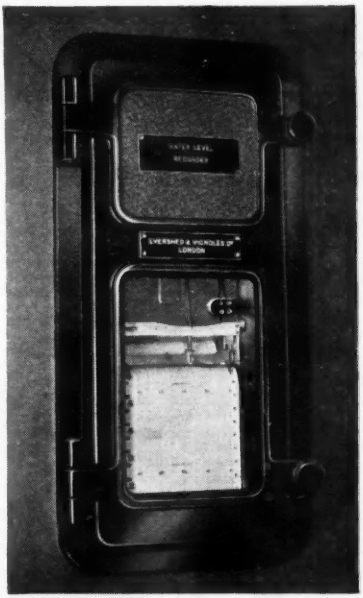

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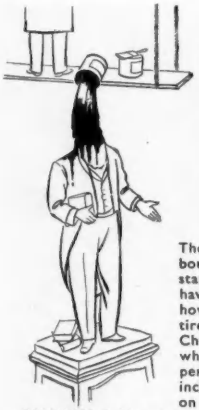

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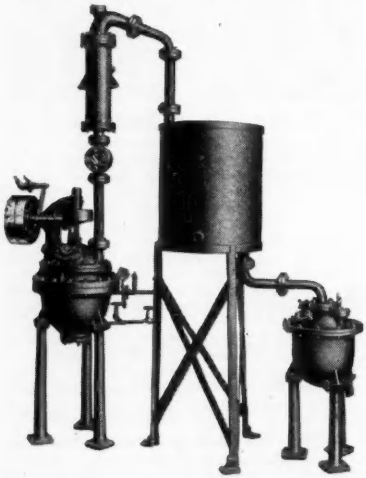

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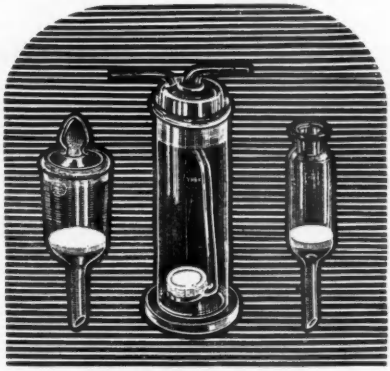

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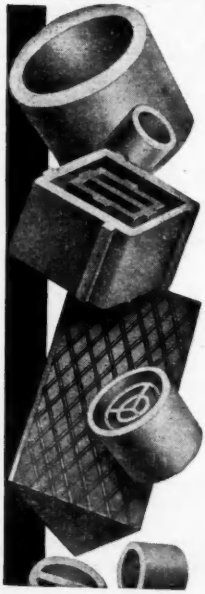

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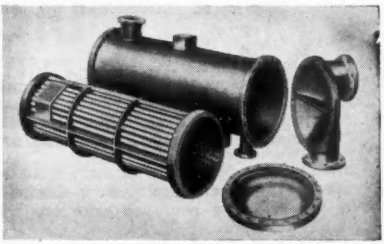

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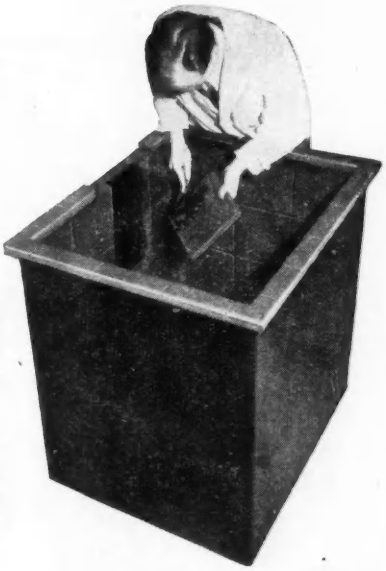
chemical tiles



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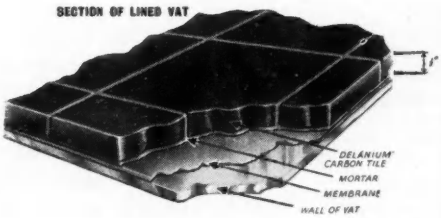

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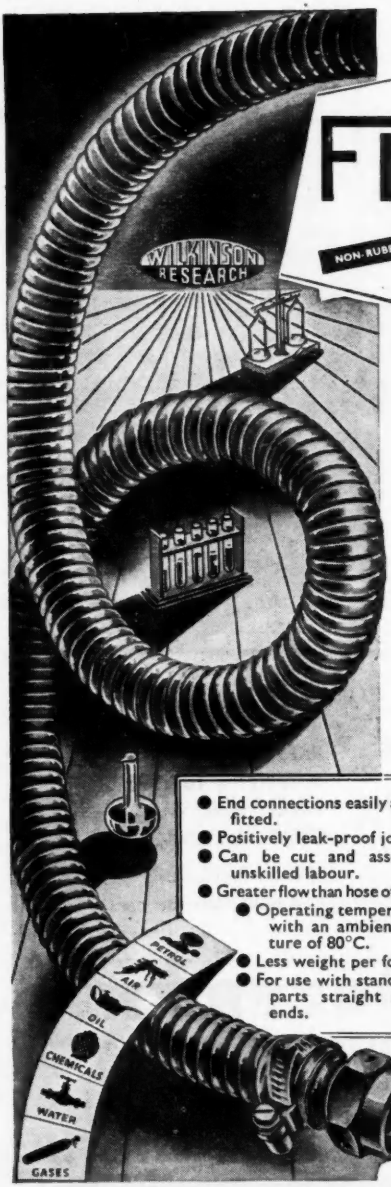

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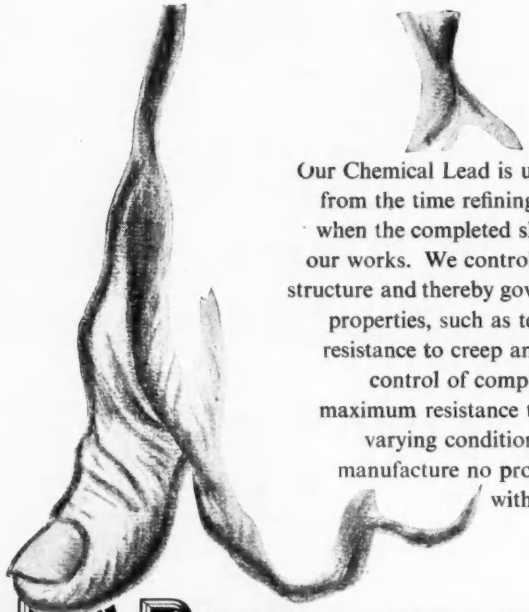

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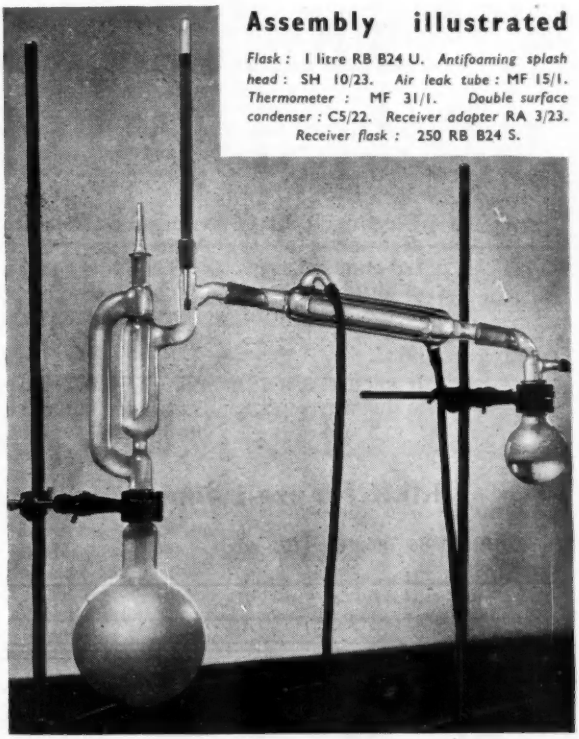

Assembly illustrated

Flask : 1 litre RB B24 U. *Antifoaming splash head :* SH 10/23. *Air leak tube :* MF 15/1. *Thermometer :* MF 31/1. *Double surface condenser :* C5/22. *Receiver adapter* RA 3/23. *Receiver flask :* 250 RB B24 S.

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Who Will Teach?

A GREAT deal has been said and written since the war about expanding Britain's facilities for technological education. Whether some people think that progress is too slow or whether others feel that it is satisfactory, it will be generally agreed that there is a new and healthy determination to develop this field of scientific training. Much less is said about the steadily crumbling foundation upon which all this effort must be built. At the risk of sounding childishly obvious, let it be pointed out that scientific education begins in the schools.

However urgently industry may require the products of technological colleges, however many young men and women there may be with some aptitude for scientific subjects, the whole process is bottle-necked at its most fundamental stage if there are not enough people prepared to teach. The fact has long been clear—qualified scientists, particularly chemists, can decide to devote their lives to teaching only if they accept severe economic penalties.

The newly proposed awards of the Burnham Committee do not rectify this long-standing and painful position. There are two problems involved. One is the general and increasing disparity between teachers' rewards and those obtained for other kinds of work and service, a disparity which increases sharply with every upward surge of the cost of living. The other problem is more specifically related to the teaching of science. It is what Sir Ewart Smith described this year at the annual proceedings of the British Association as the growing unbalance between the rewards offered in industry and teaching.

In the case of a number of subjects taught in schools, the annual demand for teachers dominates the employment market; this can even be true of scientific subjects, as the recent technical report from the Ministry of Labour on biology has shown. In chemistry this is certainly not the case. A large and varied offering of posts in industry and in other forms of Government service is offered to each year's university output of graduates. The salaries and the prospects offered by these posts are not just slightly superior to the Burnham scale offerings; they are incomparably superior. Unless something is done to meet this acute and specific situation, it will not be long before the teaching of chemistry at Britain's schools is virtually bereft of new recruits and gradually brought to a standstill.

Here is yet another example of the muddle and misfortune that always follows "planned adjustments" of the

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law of supply and demand. It is no doubt convenient that the basic rewards for teaching in schools should be scaled to some universal standard without regard for the actual subjects taught. The graduate in languages—dead or alive—must have the same economic treatment as the graduate in chemistry.

If the profession of teaching could exist within an isolated economic universe, such a principle would be both admirable and practicable. It ignores the simple fact that John Smith, B.Sc., can *choose* whether he accepts this rating of his value or whether he takes his chemical knowledge and skill to another market in which its value is assessed against a supply and demand background. John Smith, B.Sc., may want to teach chemistry and he may, with commendable enthusiasm, ignore these economic distortions. If he does this, he is clearly just the kind of man who should make teaching his life's work.

It is not only the great dearth of chemistry graduates prepared to enter teaching that is serious; it is also the wastage caused by resignations, a factor that is seldom discussed but is known, nevertheless, to exist. Unless enough young men are prepared to become and remain teachers of chemistry, there will be fewer and fewer chemists from 1960 onwards.

There are no signs that this problem, despite its national significance, is beng constructively faced. The simplest and most direct solution appears to be to create differential and superior rates of pay for the teaching of chemistry and of any other science for which the rewards in industry are so demonstrably more attractive. It is unlikely, however, that such a realistic remedy would be accepted by the teaching profession itself, or by any body concerned with its conditions, until and unless the chemistry teacher had become an almost extinct variety. Indeed, the new Burnham awards have reduced former differentials in the scales of pay; an additional increment is no longer awarded to those teachers who hold first-class honours degrees in their subjects.

Both chemists as a profession and the chemical industry should pay as much attention to the secondary schools as to the technological colleges and institutes. It is in the schools of 1950-60 that British chemistry for 1980-2000 is being shaped—for better or worse.

Notes and Comments

Terylene

ALL that is known about Terylene promotes the belief that this new synthetic monofil, which I.C.I., Ltd., is preparing to produce commercially at Wilton, will prove one of the economically important results of the growth of British petroleum industry. The worldwide demand for textiles and the soaring cost of natural materials, particularly of wool, with which Terylene is thought to compare better than nylon, confirms the good prospects—and incidentally the far sightedness of the research policies of I.C.I. (and the Calico Printers' Association) which now promotes two important substitutes. Terylene differs from Ardil in, among other things, that it is a true "synthetic", owing nothing to the common vegetable sources which provided the first artificial fibres, the rayons. It is basically an ester of terephthalic acid condensed with ethylene glycol. While credit for the initial discovery of the route to this and many other monofils belongs primarily to the brilliant inventiveness of W. H. Carothers, of E. I. Du Pont, it was left to the English chemists to make theory practicable by developing new polyesters which are believed to have rectified the serious defects of the polyamides originally proposed.

Attack on Synthetics

ANTAGONISM to the use of synthetic materials in foodstuffs, of which there has been some evidence here coming principally from the medical fraternity, seems to be gathering in the U.S.A., a much greater force than has been generated here. America, which has been foremost in developing some of these chemical improvers, substitutes and insecticides, now seems intent on discouraging their use. The impulse, however, is far from being as widely shared as that may suggest, and it is not certain that it is entirely disinterested. The "no tolerance" order for DDT in dairy products, in 1949, seems to have been the starting point of the campaign in official circles. It was unfortunate that the ruling should have been preceded by a violent Press campaign against the wide use of DDT as a crop insecticide. Later public hearings called by the powerful Food and Drug Administration covering the whole field of residual hazards and tolerance limits for insecticides and fungicides used in food production have been proceeding during the greater part of this year. There is, of course, good evidence that the toxic properties of some of the new synthetic insecticides deserve independent and judicial investigation, if only to ensure that safe application methods are made obligatory.

Prejudice?

SYNTHETICS are now becoming the target in another field for a broadside by the FDA, which proposes to rule out the use in bread making of synthetic emulsifiers, such as polyoxyethylene monostearate, which has been competing with natural lard and vegetable oils. Much the same could be said about the mono- and diglyceride products produced from the natural oils and fats—but they are exonerated. The case against polyoxyethylene monostearate is suspiciously weak; in bread it is said to deceive the consumer by giving a fresher appearance than the age of the bread should allow—as do the naturally derived glycerides. It is said that the synthetic emulsifier lowers the nutritional value of bread, despite the fact that calorific effect of any emulsifying agent is negligible. Lastly, it is said that the monostearate has not been proved to be non-toxic, although it is admitted that there is no evidence that it has had any injurious effects. There seems in all this to have been strong political pressure from farmers. One political speech com-

plained that "These chemical manufacturers have developed products designed to supplant and replace nature's products, to inject into the food supply of the nation inorganic materials as against the utilisation of organic materials." If reactionary opinion of this kind has influenced the FDA decision the contributions of modern chemistry to the food industries are seriously threatened. Each synthetic product certainly requires to be carefully and impartially judged, but there should be no ready assumption that synthetics are dangerous and natural products safe. It is disturbing that the anti-scientific attitude can exert powerful influence in a country with so vigorous a technology as the U.S.A.

Sulphuric Acid

THE statistics of production and consumption of sulphuric acid and oleum in the quarter ended September 30 issued by the National Sulphuric Acid Association, Ltd., which we are enabled to print on page 703 of this issue, are of more than usual interest in view of the existing critical position and the anxiety which is felt as to future supplies. For some months past there has been evidence that available supplies have been inadequate, and the latest figures to hand confirm that consumption by essential industries continues to increase at an almost alarming rate, while production of chamber and contact acid is less than in the June and March quarters and not much in advance of the tonnage in the September quarter of 1949. Consumption for agricultural purposes is, of course, seasonal, and may be expected to show a comparatively large figure in the September quarter against practically nil in the three-monthly periods ending June and March respectively, but the fair comparison with the September quarter of 1949 reveals an increase of over 35 per cent—from 8695 tons to 11,800 tons. Consequently, stocks of sulphuric acid and oleum at September 30 were at what appears to be the dangerously low figure of 60,839 tons compared with 67,125 tons a year ago.

Education and Technology

"THE position of Great Britain as a leading industrial nation is being endangered by failure to secure the fullest possible application of science to industry," stated the Percy report in 1945. Three years later the National Advisory Council on Education for Industry and Commerce was set up under the chairmanship of Lt.-Gen. Sir Ronald M. Weeks. Since then there have been numerous reports from various bodies and associations, special conferences and considerable airing of divergent views which have aroused national interest in Parliament and the Press. The first report of the council published this week (HMSO 1s.) is therefore a matter of some import. Its main recommendations are the establishment or development of courses of a high standard in technology, the creation of new awards of degree standard and the setting up of a Royal College of Technologists. Training of technologists is at present the concern of both the universities and the techical colleges, the latter dealing more with students direct from industry. The council agree that the universities' work should be more closely related to fundamental science than that of the technical colleges. Despite present difficulties the technical colleges already make a considerable contribution. In 1948 over 7000 students were taking full-time courses of degree standard and a further 9784 taking part-time courses. Nevertheless, the report emphasises that despite a desire to improve teaching and research and also to develop social and cultural activities, serious overcrowding and limited space have limited such progress. It is essential that this limitation due to inadequate premises should be speedily removed. In a foreword to the report the Minister of Education (Mr. George Tomlinson) states that before taking any decision he will welcome any comments on the report. It is to be hoped, however, that the council's recommendations may prove acceptable and may be implemented without too long delay, so that both colleges and industry may benefit as soon as possible.

INCREASING SULPHURIC ACID TOTALS

Higher Production and Consumption Than a Year Ago

TOTAL production of chamber and contact sulphuric acid and oleum in the quarter ended September 30—442,968 tons—showed a slight decrease compared with the figure for the previous quarter (461,025), but was 40,042 tons more than the corresponding quarter of last year. Consumption showed a similar trend, with 445,312 tons in the September quarter, 464,203 tons in the April-June quarter, and 399,850 tons in the quarter ending September 1949. These figures and the following table are extracted from statistics supplied by the National Sulphuric Association, Ltd.

An increase in the maximum prices of weak sulphuric acid (BOV) by 3s. a ton and strong sulphuric acid (ROV) by 9s. 6d. a ton has been agreed to by the Board of Trade. These increases came into operation on November 13.

PRODUCTION OF SULPHURIC ACID AND OLEUM
(Tons of 100% H_2SO_4)

	Chamber only	Contact only	Chamber and Contact
Stock, July 1, 1950 ...	27,733	30,712	58,445
Production	153,279	289,689	442,968
Receipts	43,366	12,764	56,130
Oleum Feed	—	2,206	2,206
Adjustments	−132	−279	−411
Use	85,981	120,849	206,830
Despatches	110,020	181,649	291,669
Stock, Sept. 30, 1950	28,245	32,594	60,839
Total capacity represented	198,050	306,760	504,810
Percentage production	77.4%	94.4%	87.7%

CONSUMPTION—UNITED KINGDOM
(Tons of 100% H_2SO_4)

Trade Uses	
Accumulators	2,314
Agricultural purposes	11,800
Bichromate and chromic acid	3,234
Bromine	2,916
Clays (fuller's earth, etc.)	2,861
Copper pickling	579
Dealers	5,727
Drugs and fine chemicals	2,975
Dyestuffs and intermediates	20,665
Explosives	4,994
Export	831
Glue, gelatine and size	115
Hydrochloric acid	16,295
Hydrofluoric acid	2,428
Iron pickling (incl. tin plate)	22,839
Leather	1,813
Metal extraction	502
Oil refining and petroleum products	15,062
Oil (vegetable)	2,190
Paint and lithopone	34,075
Paper, etc.	915
Phosphates (industrial)	1,027
Plastics, not otherwise classified	4,511
Rayon and transparent paper	57,798
Sewage	3,009
Soap and glycerin	3,513
Sugar refining	141
Sulphate of ammonia	59,554
Sulphates of copper, nickel, etc.	5,531
Sulphate of magnesium	1,433
Superphosphates	102,294
Tar and benzol	4,622
Textile uses	5,851
Unclassified [including borax and boracic acid; chlorsulphonic acid; formic acid; oxalic, tartaric and citric acids; phenol (synthetic); rare earths; sulphate of alumina; sulphate of barium; sulphate of zinc]	40,898
Total	445,312

RAW MATERIALS
(Tons)

	Pyrites	Spent Oxide	Sulphur & H_2S	Zinc Concentrates	Anhydrite
Stock, July 1, 1950 ...	66,879	185,257	78,661	25,409	835
Receipts ...	45,607	56,927	75,011	65,841	42,811
Adjustments ...	−11	+12	+148	—	—
Use	45,389	47,098	91,497	43,868	43,576
Despatches ...	519	5,747	15	15	—
	1*	271*			
Stock, Sept. 30, 1950 ...	66,566	189,080	62,308	47,367	70

* Used at works for purposes other than sulphuric acid manufacture.

Welding Plant for Australasia

THE board of Murex, Ltd., Rainham, Essex, has collaborated with Australian associates in the formation of a new company Murex (Australasia) Pty., Ltd., whose primary purpose will be to manufacture and sell Murex arc welding electrodes and equipment. It will employ the advanced electrode manufacturing plant and techniques developed by Murex Welding Processes at Waltham Cross. The full resources of the extensive Murex research organisation in England will be at the new company's disposal. Its head office, modern factory and research department will be at Derwent Park, Hobart, Tasmania, and branch offices will be established in all Australian State capitals and later in New Zealand.

On the board of directors of the Australian company are Mr. Francis H. Foster, Mr. C. P. Flockart and Mr. D. E. Hopkins. The general manager is Mr. Wilfred T. Bennett.

Mr. E. J. Clarke, director and development engineer to Murex Welding Processes, Ltd., is already in Tasmania to advise on the installation of plant.

MORE BASIC CHEMICALS USED

Production Also Higher in Some Cases

CONSUMPTION of many basic chemicals and non-ferrous metals in August was higher than in the same month of 1949. An outstanding example is tin, of which consumption was nearly three times as large as it was a year ago, 5160 tons against 1900 tons. Other increases (in thousands of tons) were: Sulphur 30.5 (25.5); molasses for distilling (cane and beet) 42.3 (29.4); industrial alcohol (mil. bulk gal.) 2.94 (2.26); virgin aluminium 15.2 (13.8); virgin zinc 17.3 (15.8); zinc concentrates 14.5 (10.8); natural rubber 4.52 (3.40).

Higher production of several basic materials was recorded. It included an increase in the yield of sulphuric acid to (in thousands of tons) 147.3 (131.1); molasses (cane and beet) 10.5 (7.8); virgin zinc 5.13 (4.70). Exceptions were superphosphate and compound fertilisers, which were slightly down in both production and consumption.

Estimated numbers employed in all sections of the chemical and allied trades in August again showed a slight increase over the totals for the previous month, 449,100 (446,100). Distribution of workers (in thousands), compared with July, was: Coke ovens, chemicals and dyes, explosives and fireworks 258.8 (257.7); pharmaceutical, toilet preparations, etc., 84.0 (83.2); paint and varnish 39.0 (38.8); oils, greases, glue, etc., 67.3 (66.9).

These figures are part of the current issue of the *Monthly Digest of Statistics*, No. 58, October. (H.M.S.O., 2s. 6d.)

	August, 1950 Thousand Tons			August, 1949 Thousand Tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	147.3	148.0*	—	131.1	126.0*	—
Sulphur	—	30.5	80.2	—	25.5	105.8
Pyrites	—	16.1	69.5	—	16.1	72.1
Spent oxide	—	15.8	188.6	—	15.7	173.3
Molasses (cane and beet)	10.5	42.3†	181.7	7.8	29.4†	251.2
Industrial alcohol (mil. bulk gal.)	2.74	2.94	0.52	2.13	2.26	4.26
Ammonia	—	6.83	10.46	—	6.45	6.49
Superphosphate	15.9	13.5	—	16.0	13.9	—
Compound fertilisers	138.1	78.9	—	138.4	112.5	—
Liming materials	—	403.0	—	—	429.0	—
Nitrogen content of nitrogenous fertilisers	21.57	19.69	—	21.52	19.16	—
Phosphate rock	—	75.5	354.3	—	82.9	245.7
Virgin aluminium	2.35	15.2	—	2.57	13.8	—
Virgin copper	—	25.7	126.1	—	28.1	149.9
Virgin zinc	5.13	17.3	54.7	4.70	15.8	75.7
Refined lead	4.81	13.5	81.3	1.86	15.3	65.2
Tin	2.50*	5.16	—	2.28*	1.90	—
Zinc concentrates	—	14.5	78.0	—	10.8	46.5
Magnesium	0.25	0.29	—	0.28	0.31	—
Pig iron	177.0‡	124.0‡	606.0	182.0‡	132.0‡	494.0
Steel ingots and castings (including alloys)	279.0‡	—	1,187.0	288.0‡	—	1,320.0
Rubber: Reclaimed	0.59	0.58	2.55	0.41	0.43	2.98
Natural (including latex)	—	4.52	36.1	—	3.40	42.3
Synthetic	—	0.05	0.97	—	0.07	1.59

* July. † Distilling only. ‡ Average of five weeks.

Potash in North Yorkshire

HIGHLY satisfactory results from the potash finds in North-east Yorkshire were reported by the chairman of Fisons, Ltd., in the annual report. Examination of the cores showed the presence of a zone containing potassium chloride extending for over 30 ft. with a 7 ft. thick seam averaging 23 per cent of potash at 3455 ft. Of this a 12 in. thick band was pure potassium chloride and gauged by Continental standards might well be regarded as a remarkable find.

New Standard Tests for Latex

A NEW standard for methods of testing rubber latex (B.S. 1672:1950) has just been issued by the British Standards Institution. This standard is a revision of part of B.S. 902 and includes fresh information on sampling, determination of total dissolved solids, dry rubber content and alkalinity. Its issue recognises the importance of recent advances in latex technology and has accordingly been made in advance of that of the rest of the original standard.

NOBEL PRIZE AWARDS

Chemical Synthesis Discovery

THE Nobel Chemistry Prize for 1950 has been jointly awarded to Emeritus Professor Otto Diels, aged 74, of Kiel University, and his former assistant Professor Kurt Alder, aged 48, who is now at Cologne University where he is director of the Chemical Institute.

The chemistry award was made for the discovery and development of the dien synthesis, which made possible the combination of previously unreactive substances. The synthesis is said to have proved itself superior in many fields in significance and usefulness to all other artificial production methods in organic chemistry. The Diels-Alder reaction is widely used in the production of dyes, chemical drugs, and plastics, and is claimed to have greaty benefited the chemical industry.

Prize for Nuclear Physicist

A British nuclear physicist, Professor Cecil F. Powell, was honoured with the prize for physics. The professor, who is 46, is Melville Wills Professor of Physics at Bristol University, and head of a university research team in nuclear physics and cosmic radiation. He was a research student under Lord Rutherford, and last year was awarded the medal of the Royal Society.

Professor Powell discovered the meson and established the fact that there were two mesons—the μ-meson and the π-meson—which confirmed the calculations of the Japanese physicist Hideki Yukawa who received the Nobel prize in 1949.

The award this year is for Professor Powell's work on the development of the photographic method for the study of nuclear processes.

The Nobel Prize for Literature 1950 was awarded to Earl Russell, O.M., for his "versatile and important writings in which he has shown himself an apostle of humanity and freedom of thought." Philosopher, mathematician, and scientist, Lord Russell, aged 78, was selected last year to give the first of the series of Reith lectures on the BBC. Among his best-known works is the "History of Western Philosophy."

The prizes, which are each worth more than £11,000 which can be drawn by the winners in their own currency, will be handed over at the Nobel Jubilee Festival in Stockholm on December 10.

NEW SYNTHETIC FIBRE

I.C.I. to Produce Terylene

I.C.I., Ltd., is to build at Wilton, North Yorkshire, a plant for the manufacture of the new textile fibre, Terylene. Terylene, says an I.C.I. statement, has recently been undergoing intensive development in the group's laboratories and also in the U.S.A., where it is known as Fibre V. It is, however, the product of exclusively British research, and the news that Britain is to start production on a commercial scale will be welcomed throughout the textile industry.

11 Million lb. a Year

The new plant will produce Terylene at the rate of 11 million lb. per year, and will be designed to permit rapid extension when that becomes necessary. Raw materials will be obtained from the oil-cracking plant which I.C.I. has now almost completed on the same site and the fibre will be manufactured both as continuous filament and as staple fibre.

A pilot plant with a capacity of several hundred tons per annum has been erected in Lancashire and this plant, in addition to providing technical data for the design of the large-scale plant, is producing material for development work by leading firms in the textile industry.

Terylene is chemically different from any other synthetic fibre. It was discovered in 1940 in the laboratories of the Calico Printers' Association by two chemists, Whinfield and Dickson, who are both now employed by I.C.I. The CPA has made over to I.C.I. the manufacturing rights for the whole world outside the U.S.A. and I.C.I. has been developing the fibre in the laboratories of its plastics division at Welwyn Garden City.

Little Stretch

The synthetic is said to be more than twice as strong as cotton and stretches very little. Its resistance to weathering is good, and it is little affected by most acids. The fabrics it provides can be set by heat to make them unshrinkable and are not affected by moths. Dyeing the fibre has presented some problems, which are now being overcome.

I.C.I. states that the textile properties of Terylene fabrics are remarkably good. It has many of the attractive characteristics of silk and of wool and special attributes, such as crease-resistance and easy laundering, which are not common to natural fabrics.

CHEMISTRY IN THE MODERN COMMUNITY

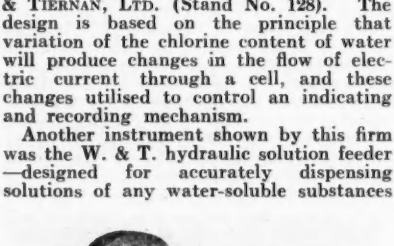
Public Works and Municipal Services Exhibition

THE importance of chemistry to the general needs of the community in modern civilisation was well demonstrated in the Public Works and Municipal Services Congress and Exhibition held at Olympia, London, this week.

These two events—previously held in alternate years—reflect the wide and varied range of local government activity.

Developments in the water treatment field include the new amperometric chlorine residual recorder shown by WALLACE & TIERNAN, LTD. (Stand No. 128). The design is based on the principle that variation of the chlorine content of water will produce changes in the flow of electric current through a cell, and these changes utilised to control an indicating and recording mechanism.

Another instrument shown by this firm was the W. & T. hydraulic solution feeder —designed for accurately dispensing solutions of any water-soluble substances such as sodium carbonate, sodium hydroxide, aluminium sulphate, sodium aluminate, phosphates, soluble silicates and dilute acids. It can be operated manually as a constant feed unit, intermittently in relation to other mechanical operations, automatically to proportion chemical dosage to meet fluctuations in flows or coupled to a visible vacuum solution feed chlorinator when it will work in step with the chlorine flow. Typical applications are *p*H control of corrosive waters and feeding of precipitants for treatment of sewage and industrial wastes.



[By courtesy of Bell Bros., (Manchester 1927), Ltd.

Chemical pump, with double check valves for all types of chemicals such as sulphate of alumina, sulphate of ammonia, chalk, soda, etc. Pumps and valves made of suitable materials for dealing with any specific chemical can also be supplied

Equipment for water filtration, softening and sterilisation was shown by BELL BROTHERS (MANCHESTER 1927), LTD. (Stand No. 100). The types of filter on view were the mechanically agitated filter and vertical air scoured and gravity models. Another interesting exhibit was a Filter Control Table, equipped with Lockheed Control Gear for the operation of valves on either pressure or gravity filters.

New in the sewage disposal field is the Comminutor displayed by JONES AND ATTWOOD, LTD. (Stand No. 102). This machine, although already established in the U.S.A., is a comparative newcomer here. It combines the functions of screening and disintegration, and thus removes the screening problem from the sewage purification process, with its attendant troubles of high maintenance costs, unsightly screening dumps, and the disposal of screenings.

Sampling Machine

Another new appliance of value to works chemists, the first of its kind, is a machine for taking samples of sewage at regular intervals day and night. This was exhibited by HARTLEYS (STOKE-ON-TRENT), LTD. (Stand No. 6).

Recorders of both mechanical and electrical transmission types for the measurement of flows and levels and for recording measurements of sewage and trade effluents were displayed by THE LEA RECORDER CO., LTD. (Stand No. 10), while a demonstration of high grade protective treatments for steel pipes comprising especially bituminous internal and external protections was displayed by STEWARTS & LLOYDS. LTD. (Stand No. 99). This firm also showed a section of 12¾ in. by

330 in. thick line pipe in grade B steel, sheathed and wrapped externally. Forty-two miles of this line pipe were supplied for the transportation of crude oil from the Firth of Clyde to the new refinery at Grangemouth.

The X-ray diffraction method in the study of industrial dusts with a diagrammatic model showing how the films were obtained formed the principal item of the National Physical Laboratory exhibit on the stand of THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH (Stand No. 124). Another interesting display was the mobile laboratory shown by the materials and construction division of the Road Research Laboratory.

Control of Pests

Gammexane insecticides in the form of dusts, smokes, sprays and concentrates for the control of all the important insect pests were specially featured by IMPERIAL CHEMICAL INDUSTRIES, LTD. (Stand No. 22). A new emulsion concentrate 20 per cent gamma BC can be diluted in water for use as a non-inflammable spray which leaves no residual odour or unsightly deposit.

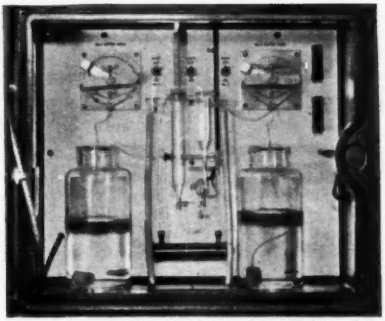
The use of gas in the laboratory formed an important section of the display by THE GAS COUNCIL (Stand No. 110). One item was a gas-fired muffle furnace suitable for operation at all temperatures up to and including 1000° C. It may be used for testing materials at various temperatures, assaying, metal and heat treatments, enamel work, pottery and glass firing, and analytical work. Rapid heating from cold is obtained and gas consumption is low. A pyrometer may be added. Another exhibit was a high speed steel hardening furnace for heat treatment of carbon and high speed steels in the tool room.

Rubber powder and its use in road construction, methods of operation and application were displayed by the BRITISH RUBBER DEVELOPMENT BOARD (Stand No. 229).

Drums for Packaging

Packaging problems whether for the home market or overseas were specially dealt with by METAL CONTAINERS, LTD. (Stand No. 210). A representative display showed the firms products from a small 2-gallon super keg to a 50-gallon capacity drum.

Aluminium sulphate in modern water purification, treatment of sewage and trade effluents were exhibited by PETER SPENCE & SONS, LTD. (Stand No. 249).



[By courtesy of Wallace and Tiernan, Ltd.

Close up view of the glass-fronted case which houses the mechanism of the amperometric recorder which measures free or total chlorine residuals differentially upon the operation of a simple tumbler switch

Aluminoferric (aluminium sulphate with a trace of iron sulphate) forms an aluminium hydroxide precipitate. This is highly adsorptive and removes particulate matter from water in two ways. First electrostatically by the positive charge of the aluminium hydroxide neutralising the negative charge carried by colloidal and semi-colloidal organic material including bacteria. Secondly, mechanically by the flocs of alumina precipitate enmeshing particulate material, which settles with the floc.

Instructional Films

Scientific methods of pest control and periodic displays of films were shown by the Infestation Control Division of the MINISTRY OF AGRICULTURE AND FISHERIES (Stand Nos. 161 and 162). The division makes recommendations for the control of infestations by the application of fumigants, sprays, dusts and smokes.

A half-scale working model of a dust recovery filtration plant for removing dust contamination from the air conditioning efflux from factories, power houses, etc., and the recovery of valuable process materials was demonstrated by VOKES, LTD. (Stand No. 186). Micro-Vee panels were also shown for dry filtration and Five-Ply panels were on view both for dry and in oil-wetted form as used in stationary power plants.

The useful work of the BRITISH STANDARDS INSTITUTE, together with a number of its pamphlets, handbooks and publications on chemical engineering, metallurgy, etc., was demonstrated on Stand No. 80.

DE-WATERING OF SLUDGE

The Effects of Freezing With Added Chemicals

by G. S. CLEMENTS, A.R.C.S., F.R.I.C., R. J. STEPHENSON, M.Sc., Ph.D., A.R.I.C., and C. J. REGAN, B.Sc., F.R.I.C.

THE desirability of recovering sewage sludge in a form in which it may be conveniently used is complicated by the problem of rapidly de-watering sludge without use of expensive processes. An investigation of this problem has been carried out by G. S. Clements, R. J. Stephenson and C. J. Regan, of the London County Council. Their findings have been published in a paper, given at the Public Works and Municipal Services Congress, held on November 17, under the auspices of the Institute of Sewage Purification. ("Sludge De-Watering by Freezing With Added Chemicals").

In conducting this investigation the plan followed was to inquire into the types of sludge amenable to treatment, the conditions of freezing, the choice of chemicals, the physical effects observed, and the physical and chemical characteristics of the resultant products.

Rapid Filtration Achieved

The authors say that the finding of answers to these questions required a long series of experiments, at the end of which it was possible to say that a technique had been worked out which permitted the filtration of all types of sewage sludge at rates far higher than any achieved in normal filtering practice.

The effect of freezing was tested on all types of sewage sludge—primary sedimentation sludge, digested sludge, and activated sludge. All these kinds responded to treatment, and were examined with and without the addition of chemicals.

It was found that complete freezing was necessary, even small quantities of unfrozen material having a considerable deleterious effect, especially on filtration. Cooling to freezing point, without actual freezing, produced no significant improvement in settlement or filtration.

A series of experiments was carried out to ascertain the effect of extending the time for freezing. In the preliminary work the sludge was retained in the frozen state for periods of 30 minutes, 1 hour, 1½ hours, and 2 hours, and, with the equipment then available (which permitted only a relatively slow freezing rate), it was found that there was little difference in results with prolonged retention in the frozen state.

At a later stage, however, it became necessary to consider this question from another aspect—that of the actual rate of freezing. This was determined by a set of factors, the most important of which were the freezing temperature, the thickness of the sludge layer frozen, and the time of storage after freezing. These factors became the subject of a special investigation.

Freezing greatly accelerates the settlement of all types of sludge. For one hour's settlement the figure is fairly consistent at about 45 per cent for digested and activated sludges. For primary sedimentation sludge it is not so good and it seems that the large fatty matter content may be responsible. The effect of the addition of chemicals is to produce in the first two types a very rapid initial settlement, although the final one hour's settlement remains at about 45 per cent.

The effect of freezing on the filtrability of sludges is most remarkable. In all cases, sludges after freezing and thawing responded well to vacuum filtration, but the rate of filtration was increased to "unprecedented" levels by the addition, before freezing, of selected chemicals.

It was considered that the action of freezing in promoting settlement might be due to the abstraction of water as ice, with a consequent concentration of the electrolytes dissolved in the interstitial liquor of the sludge. There was a possibility that this action might facilitate precipitation of colloidal material.

Addition of Electrolytes

Electrolytes used to test this hypothesis included common salt, sulphuric acid, the salts of tri-valent metals, and gaseous chlorine. Far from being advantageous, the addition of common salt was found to slow down filtration, and for two very high concentrations—1000 and 5000 parts per million—a marked and progressive decrease in the solids content of the filter-cake was noted.

One of the objects of using sulphuric acid was to study the effect of freezing at low *p*H, however, even substantial additions produced only a small effect on settlement and filtrability.

The most striking results were produced by the use of salts of the trivalent metals,

iron being used in the form of chlorinated copperas and aluminium as aluminium sulphate.

As good results had been partly obtained with chlorinated copperas, it was thought likely that the result might be due to the oxidising effect of the ferric iron present, especially as the oxygen demand of the sludge liquor had been found to be reduced by the treatment. This raised the question of using other oxidising agents, and experiments were undertaken on the use of chlorine in conjunction with freezing.

Chlorine was tried, quite ineffectively, in the form of sodium hypochlorite, but there was an appreciable result by the addition of chlorine water. An increased chlorine dosage was obtained by the addition of chlorine hydrate, produced by passing chlorine gas through a mixture of water and ice. The improvement from such relatively high, but still economically feasible, doses of chlorine was encouraging, although the rate of filtration was a good deal lower than that obtained by the use of salts of iron or aluminium.

A possible explanation of the action of chlorine is that it combines with the iron compounds always present in sludge, and that these compounds effect the precipitation on freezing.

It was established that chemicals must be added before freezing, and preferably after the sludge has been cooled, but before any part of it is frozen. The addition of chemicals after freezing and thawing leads to a much slower rate of settlement than when the chemicals are added before freezing, and the rate of filtration is greatly reduced. The results obtained in the tests were, in fact, worse than those in which the sludge was frozen without chemicals, the only advantage being the production of an exceptionally clear supernatant.

Minimum Doses Required

The minimum effective doses of chlorine, of chlorinated ferrous sulphate, and aluminium sulphate were investigated. It was found that the threshold value for effective action for chlorine was of the order of 100 to 200. Of the tri-valent metals, 100 p.p.m. of ferric iron gave a substantial result, although there was an appreciable effect at 50 p.p.m. Aluminium sulphate in concentrations representing as little as 20 p.p.m. of aluminium gave a significant improvement.

With iron and aluminium compounds, the dosage was increased up to 1000 p.p.m., and the speed of filtration and the quality of the filter-cake improved progressively over this range. The improvement when chlorine was used increased to a maximum, beyond which additional chlorine produced no further effect. This point may coincide with the limit of iron in the sludge, with which the chlorine possibly combines to form ferric iron precipitants.

The supernatants and filtrates have a comparatively low oxygen demand of the order of three times or less that of an untreated sewage.

The filter-cakes obtained on filtering the thawed sludges after freezing with chemicals were distinguished by the rapidity with which they were produced, their high solids content (23 per cent to 30 per cent), the ease with which they could be detached from the filter-cloth, and by their porous and friable texture. The times of filtration, with moderately large doses of chemicals, were of the order of seconds, and the rate of production by vacuum filtration, was, in terms of dry solids produced, as high as 350 lb. per hour per sq. ft. of filtering surface for digested sludges, and up to 70 lb. for activated sludges.

After thawing, all the samples were settled in 1-litre cylinders, and, after the rates of settlement had been noted, were decanted to half-volume and vacuum-filtered on a laboratory Buchner funnel.

Defects of Mechanical Stirring

The results indicated that thawing at slightly more than the ordinary temperature, and thawing with steam both gave good results for settlement and filtration. Mechanical stirring, however, led to serious defects. The filtration period was increased by six to twelve times that of the unstirred samples, although, probably by reason of the disentrainment of carbon dioxide from the sludge, the settlement was better in the stirred sample.

Determinations of the oxygen absorbed from $KMnO_4$ in four hours indicated that the supernatant liquor from the stirred sample was considerably worse than that from the unstirred sample. This adverse effect appears to occur only when the agitation is quite vigorous, and the results emphasise the importance of avoiding pumping after thawing has taken place.

In the projected Northern Outfall Works pilot installation, therefore, provision is to be made for the sludge to be fed by gravity from the thawing compartment to the filter. It is proposed at first to use a small experimental Dorr-Oliver filter, with a drum 1 ft. long and 1 ft. in diameter, and with filtering area of 3.1 sq. ft. The separation of solid and liquid on thawing is so definite, and the solid so dense and particulate, that it is unlikely

that it will be picked up on the filter cloth by the rotation of the drum in a trough. An alternative means will have to be devised for running the sludge directly on to the filtering surface. The highest capacity for filters of this type is estimated by the manufacturers to be 100 lb./hr./ft.^{2} of dry solids.

In these present experiments at the Northern Outfall Works, outputs of the order of 350-lb./hr./ft.^{2}. were obtained, and it appears certain that if on a practical scale quantities like this were desired, very considerable modification of existing type of filter would be necessary. The possibility of using other and possibly simpler methods of filtration has, of course, not been overlooked.

The investigation has at present only covered a preliminary stage, and it is impossible to give any definite estimate of the cost such a process would involve. It is, of course, impossible to give even a rough idea of the capital expenditure which would be necessary for plant. On the running cost side, figures can only be put forward on an extremely tentative basis. These show, however, that the cost involved would not be out of all reason.

The power required to produce a ton of ice at the large plant at Grimsby is 26 kWh, and it is reasonable to assume that by making use of the thawing ice to cool the refrigerant a saving of at least 25 per cent of the power could be effected, leaving a figure of 19.5 kWh per ton. It is difficult to obtain an exact figure for the cost of electric power at a high load factor as it is likely that a reduced charge could be made, but the figure would be of the order of one penny per kWh. This would enable a ton of sludge to be frozen for 1s. 7½d.

The cost of chemicals to treat a digested sludge, of say 5 per cent dry solids, so that it could be filtered at the rate of 40-50 lb. dry solids per sq. ft. per hour is comparatively small. It works out at about 5d. per ton of wet sludge, whether chlorine, chlorinated ferrous sulphate or aluminoferric are used. This is due to the fact that the efficiency of the chemicals increases with their cost. The total running cost of this part of the treatment would, therefore, be of the order of 2s. per ton of wet sludge.

No experiments with a filter drum have yet been carried out and so no information is at present available as to the cost of filtration at these high rates.

Research Expanded Ten Times in Ten Years

THE great expansion of the research programme of Glaxo Laboratories, Ltd., and the intention at least to maintain the work on this scale in the future was evidenced in the review by the chairman (Sir Harry Jephcott) of the year ended June 30.

Expenditure upon research and development had steadily increased and was now more than ten times greater than in 1939, he said. During the year a large extension of the research department at Greenford had more than doubled the laboratory space available. The new research laboratory for work on antibiotic substances and related problems at Sefton Park had been occupied since June.

In addition, development facilities at Ulverston had been increased and further expansion was planned. It was of the nature of research work that success could not be guaranteed; research expenditure must in any event be continued over a period of years if results of value were to be achieved. It was considered wise to make such financial provision as would ensure continuity of this work of research and development and a reserve had now been created for future research and development. Should less favourable times arrive this reserve would be used to maintain work of research and development.

During the year the total sales overseas by the parent company and its subsidiaries had increased by over 30 per cent.

The company's investment overseas continued to grow and it would be necessary to increase it as further development of certain of the overseas subsidiary companies became desirable. While most of the company's overseas and export business was within the sterling area, it was especially satisfactory to report that there was now a substantial dollar export business. With the object of further enhancing dollar sales, a Canadian subsidiary company had recently been formed and Mr. J. Hutchinson, who for some time past had been executive sales director in this country, had become resident managing director of Glaxo (Canada), Ltd.

Throughout the year particular attention had been given to increasing the efficiency of all manufacturing processes and thereby the productivity. In this respect the reports of the Anglo-American Productivity Teams had been welcomed. It was believed that further benefit would follow from the continuous development of friendly interchange between American and British industries.

CARBON AND GRAPHITE

*Value of Special Properties to the Chemical Engineer**

by W. S. NORMAN, Ph.D., A.M.I.Chem.E.

CARBON and graphite have many properties of value to the chemical engineer. In the first place they are inert to most chemical reagents with the exception of strongly oxidising compounds such as oleum, chromic acid and nitric acid. In particular it is one of the few materials resistant to aqueous hydrofluoric acid and to phosphoric acid at all temperatures.

The coefficient of thermal expansion is low (about one-third that of steel) and carbon and graphite are highly resistant to thermal shock. In an inert atmosphere graphite is stable at all temperatures up to 3000° C. and its strength remains unimpaired at high temperatures. Carbon is also stable at high temperatures, though of course graphitisation commences at temperatures above 2000° C.

When heated in air, carbon starts to oxidise at about 350° C. and graphite has a critical oxidation temperature of about 450° C. However, in spite of this apparent limitation, carbon is proving satisfactory for lining the hearth and walls of blast furnaces and for many other applications in the metallurgical industries where some degree of oxidation is encountered.

Conductivity Properties

One of the most valuable properties of graphite is its high thermal and electrical conductivity. Fully graphitised carbon has a thermal conductivity of about 75 B.Th.U./ft.² hr. °F. per ft., but it is often preferable to use a material of lower conductivity, in the region of 40 B.Th.U./ft.² hr. °F. per ft., as this grade has better strength and hardness properties.

For comparison, brass has a conductivity of 60 while the value for stainless steel is only 15 in the same units. This property is turned to good account in the use of graphite heat exchangers for corrosive fluids.

Carbon and graphite can be cut and machined to the standard engineering tolerances. In the case of carbon, the tools should be tipped with a hard alloy resistant to abrasion, and for many operations grinding is preferable to machining.

The self-lubricating properties of certain grades of carbon and graphite are of value in many applications, typical examples being brushes for electrical contacts and bearings, glands and sealing rings where no lubricant can be employed. Compressors with cast-iron cylinders and carbon piston rings are used for compressing hydrogen chloride gas and for other purposes where lubricant cannot be used.

Recent investigations indicate that the self-lubricating property of graphite is probably due to the presence of a very strongly adsorbed film of moisture. Experience with electric motors and dynamos in aircraft has shown that under the very dry conditions encountered at high altitudes the graphite brushes become abrasive, causing rapid wear, and it is thought that this occurs due to the failure of the lubricating film of water.

Impermeability

A certain degree of porosity is inherent in all carbon products, and while the permeability may be reduced by decreasing the pore size it has not so far been possible to achieve complete impermeability in this way.

The porosity and permeability can be decreased by impregnating with a material such as pitch and carbonising, but this treatment does not confer complete impermeability since new pores are created during the carbonising.

It has been stated that the carbon directing vanes used on the German V-2 rockets were given 14 successive impregnation and firing treatments to enable them to withstand the action of the blast of hot gas from the rocket motor.

For most chemical engineering applications, carbon and graphite are rendered impermeable by impregnation with a liquid resin which is then polymerised, usually by heat treatment. Impregnated carbons have practically the same corrosion resistance as the parent carbon, but they cannot be used at temperatures above the decomposition point of the resin, usually about 160-168° C.

Synthetic resins are satisfactory for cementing carbon to carbon or to stoneware, metal, glass, etc. Several proprietary cements are available for use in the erection of carbon equipment or for cementing carbon tiles or liners in vessels.

In the design and construction of carbon equipment, due allowance should be made

* Abstract of an article by the Birmingham University lecturer in chemical engineering in the *Birmingham University Chemical Engineer* (2, (1), 14-21.)

for the fact that carbon is a brittle material and liable to fracture if exposed to mechanical shock. Unsupported lengths of carbon or graphite pipe may be broken by accidental damage, water hammer or excessive vibration, and it is good policy to provide the highest possible degree of protection.

A further feature of carbon is that its compressive strength is about five times as high as its strength under tension, and it is therefore an advantage if the carbon is subjected to compressive stress and any tensile load taken up by metal reinforcement. This technique is standard practice in other fields, such as the construction of reinforced concrete, but it is not always realised that carbon requires similar treatment.

Graphite Heat Exchanger

An example of what can be done in this way is the Powell Duffryn Research Laboratories' heat exchanger formed of a block of graphite perforated by rows of passages for the two fluids. The graphite is maintained under compression by two heavy cast-iron clamping plates at top and bottom, and the carbon headers are also held in position by backing plates of heavy section to ensure that no distortion takes place under load. The bolt tension is adjusted so that the pressure of the fluid in the block and headers is neutralised and the carbon is subjected only to compressive loads.

It is impossible in a short paper to review all the applications of carbon and graphite in the chemical industry, but the following list affords some typical examples:—

- Pumps, valves and pipes for corrosive fluids.
- Furnace tubes, retorts and linings.
- Electrodes for electrolytic cells and electric furnaces.
- Ejectors for corrosive fluids.
- Pistons and piston rings.
- Linings for reaction vessels, pickling tanks, sulphite pulp digesters, storage tanks, absorption towers. etc.
- Packings for absorption and distillation columns.
- Heat exchangers, evaporators, boilers, condensers.

For certain applications, the particular properties of carbon or graphite make them an obvious choice, but it is more usual to have several possible materials such as carbon, glass, stoneware, and for duties which do not call for high temperatures, rubber compositions and the synthetic resins may also be considered.

The choice will be determined ultimately on economic grounds, and the following general considerations may be of assistance. Weight for weight, carbon is usually more expensive than glass or stoneware, but to some extent this is offset by the ease with which it can be fabricated and assembled, thus reducing erection costs.

Corrosion resistance and the working life are most important factors since they determine not only the cost of maintaining or renewing the equipment but also the loss of production time during overhauls.

Unfortunately accelerated corrosion tests are not always reliable since failure often occurs through other causes such as thermal shock, abrasion or surface cracking. The problem is so complex that plant experience over a period of years is the only reliable guide.

For heat transfer purposes, graphite stands supreme among the non-metallic materials. Apart from its corrosion-resistance it has the advantage that it will not cause contamination of solutions. For this reason it is finding application in the manufacture of fine chemicals, foodstuffs and fruit juices, where corrosion is not very severe but freedom from contamination is most important.

Estimation of Lead Oxide

AMONG papers presented and discussed at a meeting of the Chemical Society at Burlington House on November 1 was "The Determination of the Lead Oxide in the Presence of Lead," by R. M. Black, M.Sc., A.R.I.C.

The method described the estimation of lead and lead oxide in lead dross by means of the reaction between lead monoxide and an ammonium salt to give ammonia and the corresponding lead salt. The ammonia is removed from the solution by steam distillation, absorbed in an excess of boric acid and the ammonium borate so formed titrated with standard acid in the usual manner.

The method was stated to give reasonable accuracy with quantities of lead oxide as small as 10 mg., but further development is required before it becomes applicable to small oxide inclusions in lead sheathing alloys.

Two other papers discussed at the meeting were "The Determination of Sodium in Aluminium and its Alloys by Vacuum Distillation," by W. McCamley, B.Sc., T. E. L. Scott and R. Smart, B.Sc., A.R.I.C., and "Chemical Determination of Magnesium in Cast Iron." by W. Westwood, B.Sc., A.I.M., and R. Presser.

DEVELOPING BENZOL TECHNOLOGY

Investigations of Catalytic Processes

THE rapidly increasing demand for the aromatic hydrocarbons present in benzene as the starting point for the manufacture of styrene, synthetic phenol, plastics and explosives is one of the salient features of a review of the benzol industry in 1948, by H. E. Newall, D.Sc., Ph.D., A.R.I.C. of the Fuel Research Station, DSIR.

In the United States the demand for benzene in the chemical industry is outstripping supply and the carbonising industries can no longer meet all demands for aromatic hydrocarbons. The petroleum industry will in future play an increasingly important role in the production of these hydrocarbons. Although peace-time requirements of toluene for the manufacture of explosives can be satisfied by recovery from benzol, the large war-time demand had to be met partly by production from petroleum fractions. Because of the increasing demand for xylenes, the separation of these hydrocarbons from petroleum oils is now being carried out and the production of benzene from cracking processes may be an economic proposition.

In Britain there is a much smaller demand for benzol as a source of chemicals than in the United States, but its recovery from coal gas on the maximum scale, for use as motor fuel, is of great importance. In 1947, the total crude benzol production was 78.1 million gal., of which 58.6 million gal. were obtained by gas scrubbing at coke-oven plants, 15.4 million gal. at gas works, and 4.1 million gal. by tar distillation. The annual production in 1948 was about 93 million gal.

Reducing Sludge Formation

In 1948 considerable attention was given to the removal of sulphur compounds from coal gas. Although these investigations were not concerned primarily with benzol recovery, they have an important bearing on this subject, from the point of view both of reducing sludge formation and therefore promoting better washing efficiency and of effecting economies in benzol refining.

The purification of gas from hydrogen sulphide by means of iron oxide has several disadvantages under present-day conditions. The initial cost of the boxes is high, the area occupied by the plant is large, and the labour required for charging and discharging the boxes is costly. A reduction of labour costs and of ground space is being achieved at a number of works by the use of tower purifiers instead of the normal oxide boxes.

The preparation of iron oxide of greater activity is receiving attention here and overseas, but such material has not yet been used on a large scale.

In France, the scarcity of both natural and residual iron oxide led L. Fassina to investigate the efficiency of mixtures of manganese and iron hydroxides. The amounts of manganese and iron for optimum efficiency were determined and when these materials were mixed with sawdust a very active purifying agent was obtained. A considerable saving in labour and in ground space was thus effected.

Gas Purification

Some progress in the alternative method of gas purification has been made. It is claimed that the Manchester liquid purification process, which operates on a scale of 2 million cu. ft. of gas daily, effects purification to the Gas Referee's standards. The capital cost of liquid purification plant is stated to be only 60 per cent of that of the dry box system, and there is the further advantage that the plant requires a smaller area.

The Liverpool Gas Co. is installing a plant based on the Manchester process, capable of treating 4 to 5 million cu. ft. of gas per day, which will be used to study behaviour with the various types of gas occurring in the carbonising industry.

Plant and Newling have reported on the latest work carried out by the Gas Light and Coke Co. on the catalytic removal of organic sulphur compounds from coal gas. The nickel sulphide catalyst operates at a temperature of about 360° C. and requires regeneration after 90 to 120 days. The limit to which the organic sulphur content, other than thiophene, can be reduced is still about 3 gr. per 100 cu. ft. If the process is worked on stripped gas, a somewhat longer catalyst life and lower working costs may be expected.

Further improvements in the catalytic method developed by the Gas Research Board have been patented. A disadvantage of the earlier process was the necessity to remove hydrogen sulphide from the

These abstracts from "Benzole in 1948" are published by permission of the DSIR.

gas before treatment. The improved process first subjects the gas at 250 to 350° C. to the action of a hydrogenating catalyst, such as molybdenum sulphide. Then, in the presence of steam amounting to at least 10 per cent of the volume of the mixture, the gas is allowed to react with an oxide or sulphide of chromium catalyst carried on active carbon or activated alumina.

In discussing papers relating to the wash oil process for benzol recovery, Dr. Newall refers to the investigations of the Benzol Technical Committee of the Ministry of Fuel and Power on sludging and corrosion in benzol-absorption plants. These investigations showed that sludge formation was probably due mainly to the oxidation of unsaturated compounds, such as indene, removed from the gas, although there was evidence that elemental sulphur might play a similar role. The investigation of the reactions of oxygen with indene and the nature of the products obtained was continued after the committee had completed its work, and an account given by Newall, Ackroyd and Cawley.

German Methods

It has been reported that German benzol-recovery plants are similar to those used in Britain. Benzol absorption is generally carried out by the use of creosote oil in standard tower scrubbers. Wash oil regeneration is not normally practised, no plant of the Clayton cascade type familiar in Britain being found. At some plants where gas is raised to a pressure of 8 to 20 atm. for introduction to the gas grid, benzol scrubbing is carried out on the high pressure gas. Benzol recovery in these conditions is interesting chiefly on account of the increased concentration of benzol which is possible in the wash oil, 5 per cent being a normal figure.

The sulphuric acid process, despite its disadvantages, was the one most extensively used by the benzol-refining industry in Germany. The Ufer and Instill processes were tried at a few installations. Vapour-phase treatment with clay for the removal of gum-forming substances from petrols is used in the petroleum industry, but its application to benzol refining appears to be a new development. A plant for the treatment of benzol was operated in Germany and the gum content of the refined product was within the limits specified by the German Benzol Association, though the clay consumption was high.

The catalytic desulphurisation of benzene in the vapour and liquid phases has been studied by Glushnyov and Vasmilyov. The best results were obtained in the vapour phase with phosphoric acid and zinc chloride on activated carbon.

In the section of the review dealing with the analysis of hydrocarbon mixtures, mention is made of a method which has been used extensively for the determination of aromatic and olefinic hydrocarbons in motor spirits and coal tar distillates. This consists of extracting the sample with sulphuric acid, thus dissolving the aromatics and olefines and leaving an insoluble residue of naphthalenes and paraffins.

If fuming sulphuric acid is used complete sulphonation of the unsaturated hydrocarbons usually occurs, but some of the saturated hydrocarbons may also be sulphonated. With less concentrated acid the reaction with saturated hydrocarbons is decreased, but aromatics may be incompletely sulphonated and olefines tend to produce polymers which are not completely dissolved. The use of added catalysts, *e.g.*, silver sulphate, has been proposed.

McKee, Herndon and Withrow carried out an investigation of the isatin test for the estimation of thiophene in motor spirits. In the majority of the determinations the colours were matched by visual observation, but a more precise photoelectric method was also used. The method was also applied to cracked gasolines, but a secondary reaction, which produced a red colour, took place slowly. Various precautions to overcome this difficulty were recommended in the paper.

Phenols in Motor Spirits

Mapstone has reported a colorimetric method for the determination of phenols in motor spirits, based on the formation of blue indiphenol, by treatment of the sample with dilute ammonia and medium strength hypochlorite solution. The method is suitable in plant control work for the determination of up to 1.0 per cent of phenol, with a sensitivity of 0.05 per cent. Mapstone has also described colorimetric tests for distinguishing between phenol and the three cresoles in petrol.

Investigations of benzene poisoning are briefly reviewed. Some recent work of the Massachusetts Division of Occupational Hygiene has been discussed by Hardy and Elkins, who confirm that the concentration of benzene in a workers' environment should not exceed 35 p.p.m. Forssman and Frykols have stated that exposure to benzene creates in workers an increased demand for vitamin C and an extra supply of this vitamin raises their resistance to the effects of benzene. It has also been shown that benzene is not absorbed through the skin.

TRIFLUOROCHLOROETHYLENE

Development of Dispersions for Protective Coatings

by A CORRESPONDENT

MUCH interest has been shown during the last 18 months in the development of dispersions of the new fluorinated hydrocarbon plastics, polytetrafluoroethylene and the polymer of trifluorochloroethylene for the protection of metal, glass and stoneware.

In the U.S.A., PTFE dispersions have been made available for general appraisal work in industry for about a year and the M. W. Kellogg Company, of New Jersey, has now produced the first two of a series of KEL-F, trifluorochloroethylene polymer dispersions.

POLYTETRAFLUOROETHYLENE is now being manufactured in Great Britain in the form of granules for fabrication by moulding and extrusion, but so far not as a dispersion. The polymer of trifluorochloroethylene has not yet been produced in this country, although it is likely that eventually this most important addition to the range of fluorinated plastics will be made in Britain. Dispersions of both PTFE (polytetrafluoroethylene) and KEL-F (polymer of trifluorochloroethylene) are important new forms of both these plastics.

These dispersions are non-aqueous, containing approximately 20 and 27 per cent dispersed plastic solids having a particle size of about one micron.

The dispersion medium is usually a hydrocarbon solvent having a flash point above 80°F. The apparent viscosities of the dispersions containing 15 to 30 per cent solids range from 80 to 150 centipoises at room temperature. After the diluent evaporates there is left a white deposit of polymer particles. There are converted into a continuous semi-transparent and extremely tenacious film by fusion at 240-250°C.

The oustanding properties of trifluorochloroethylene polymer dispersions may be conveniently summarised as follows:—

1. The dispersions are remarkably stable and may be heated to 80°C. for seven days, agitated vigorously and kept several weeks at 0°C. without ill effects.

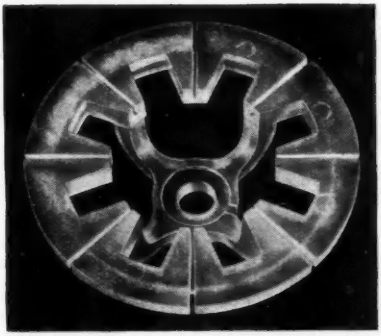
2. Dispersions are suitable for spray, brush and dip coating. If necessary, they can be diluted with xylene.

3. Polymer dispersions possess excellent adhesion to metal, stoneware, glass and other surfaces. For wire coating dispersions are available which possess high adhesion and low creep properties.

4. Film thicknesses of 0.010 in. to 0.015 in. can be built up by repeated dip coating or brushing. When properly fused, such deposits are semi-transparent. For the protection of chemical plant there is no doubt that film thicknesses of the order of 0.010 in. are desirable.

The surface of the metal or glass, etc., is first thoroughly cleaned and dried. The dispersion is then sprayed or brushed on and allowed to dry by evaporation of the solvent. Coatings can be air-dried or heated up to 150°C. prior to the actual fusion operation. Where the dispersion is employed for internal coatings it is recommended that a gentle stream of inert gas (nitrogen) be passed into or through the object so as to carry away all organic vapours before fusion commences.

Fusion, which is the next operation, requires exposure to a temperature of 240-250°C. for 45 to 60 minutes followed by a 5-10 hours' baking at 225-240°C. It is possible to reduce the time considerably by increasing the temperature, but special techniques have then to be adopted. Experience has shown that high gloss and smooth protective films are best procured by long baking at moderate temperatures.



An electronic tube base made from KEL-F

Technical Publications

OF particular interest in chemical engineering industry, in which fine control of process conditions is frequently essential, is the new series of electric proportioning valves and controls by the British Thermostat Co., Ltd., Sunbury-on-Thames, Middlesex, described in technical publication AT/28A. The series (Z.A.), augments the Teddington range of controllers for the automatic regulation of heating, air conditioning and refrigerating processes. Proportioning units adapted for use with fluids and gases are also available to order for special applications.

* * *

DETAILED information about public and industrial fire brigades and salvage corps in the United Kingdom with useful data on the science of fire prevention and extinction is contained in the "Fire Protection and Accident Prevention Year Book, 1951," published by Benn Brothers, Ltd., 154 Fleet Street, London, E.C.4 (10s. 6d. post paid). Particulars of fire brigades in the Commonwealth and Empire and in the U.S.A. and other foreign countries are also included. An additional asset of this edition is the inclusion for the first time of a desk diary.

* * *

THE state of solution of viscose has long been a problem in the chemistry of cellulose and is a matter of considerable importance to the rayon viscose pulp industries. An investigation of the state of solution in exmulsionxanthated viscoses is discussed by Fred Gärtner and Olaf Samuelson in *Svensk Papperstidning* (Vol. 53, No. 20), official organ of the Swedish Paper Mills Association and associated groups.

* * *

ACCURATE measurement of light is often essential for research work. Details of its latest direct reading auto-photometer are given in sheet No. 464, issued by Everett Edgcumbe & Co., Ltd., London. A separate photocell with interconnecting tough rubber flex minimises the risk of interception of light by the operator.

* * *

MOST aspects of the selection, installation and maintenance of air compressors are discussed at length by D. Y. Marshall in the current issue of the *Journal of Incorporated Plant Engineers* (2, 223-232). This illustrated treatise reproduces the paper presented before the Royal Society of Arts in March this year.

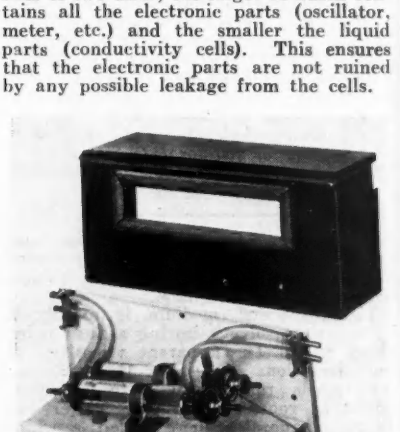
THE four main types of steel-making furnaces—Bessemer, electric arc, high frequency inducting and crucible—are described in "Steel News" (Vol. 2, No. 3) which combines the September and October issues of the journal published by the British Iron and Steel Federation. Under the title "Revolution in Food Production," another article shows the impact of steel supplies on agriculture in the form of implements, etc.

* * *

SINKING an oil well is described in an illustrated article in the current issue of "Rope Talks" (No. 24) published by British Ropes, Ltd.

* * *

DIRECT reading of the ratio of the conductivity of two liquids under continuous flow conditions is the object of a new conductivity meter designed by Edison Swan Electric Co., Ltd. The instrument consists of two units, the larger of which contains all the electronic parts (oscillator, meter, etc.) and the smaller the liquid parts (conductivity cells). This ensures that the electronic parts are not ruined by any possible leakage from the cells.



[By courtesy of Edison Swan Electric Co., Ltd.

The conductivity cells are made of Perspex tubes with monel electrodes which can easily be dismantled for cleaning. The liquid is introduced through unions designed for 3/16 in. bore flexible tubing such as PVC or telecothene

The Chemist's Bookshelf

STEREOCHEMISTRY. E. de Barry Barnett. 1950, London: Sir Isaac Pitman & Sons, Ltd. Pp. ix + 169. 18s.

This is the first textbook on stereochemistry to have been published in English for over 30 years and it should meet a wide demand. Because of its small size, however, it is restricted in scope to a survey of those topics required by students taking an honours degree in chemistry. It does not set out to be a comprehensive treatise on the subject.

The book is conveniently divided into nine arbitrary chapters, the first of which introduces the concept of spatial relationships and the general background to the topic, including a brief historical reference. Chapter 2 deals with external compensation, including the separation of enantiomorphs and racemisation. Chapter 3, which is the longest in the book, discusses atoms having a covalency of up to nine, including the rare examples potassium fluozirconate and potassium fluoniobate, and the unique compound neodymium bromate enneahydrate.

Chapter 4 surveys the properties of the allenes, spiranes *et al*, and discusses the subjects of restricted rotation and "folded rings" under the heading of "General Molecular Dissymmetry." Chapter 5 is primarily concerned with the Walden Inversion and outlines those reactions in which an inactive compound is converted into an optically active one, without a separation of optical isomers.

The ethylenic double bonds and the oximes are the principal items dealt with in chaper 6; reference is also made to nitrogen-nitrogen double bonds. In chapter 7, which is devoted to geometrical isomerism in cyclic systems, an approach to distinguishing between cis and trans isomers is discussed. One of the examples described in detail is hexachlorocyclohexane, the γ isomer of which is Gammexane.

Chapter 8 provides a dissertation on the subject of strain theory and strainless rings, and passing mention is made of recent theory on large strainless rings. Steric hindrance is the subject of chapter 9. To illustrate the extent of hindrance due to substituents a few examples from Victor Meyer's work are given. The book is completed by an appendix in which details for the making of molecular models are described.

This is a book which should be very useful in clearing up many of the difficulties encountered by undergraduates in the study of stereochemistry. Whether the rather high price is within their reach, however, is open to doubt.—P.M.

A GERMAN-ENGLISH DICTIONARY FOR CHEMISTS. Austin M. Patterson. 1950, New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Pp. xviii + 541. 40s.

This is the third edition of the work which last appeared in 1935. It contains about 59,000 references, and while these are predominantly chemical, a number of terms from related fields of science are also included. In addition, a considerable vocabulary of general words has been incorporated so as to make the use of a separate dictionary largely unnecessary. Self-evident words have, however, been excluded. The latest decisions in nomenclature have been followed throughout.

The dictionary, in this new edition, is appreciably bigger than its predecessors and has an improved binding. Despite the effect of re-valuation on the price, it is well worth the money and is highly recommended for easier reading of German scientific literature.—P.M.

Books Received

INORGANIC MICRO-ANALYSIS. H. V. A. Briscoe and P. F. Holt. 1950, London: Edward Arnold & Co. Pp. vii + 171. 12s. 6d.

FORENSIC SCIENCE AND LABORATORY TECHNICS. R. F. Turner. 1949, Illinois: C. C. Thomas. Oxford: Blackwell Scientific Publications, Ltd. Pp. xxv + 240. $6.50.

A MANUAL OF PLASTICS AND RESINS. Edited by W. Schack. 1950, New York: Chemical Publishing Co., Inc. Pp. 547. $10.00.

REVIEWS OF PETROLEUM TECHNOLOGY. Vol. 9, 1947. Edited by F. H. Garner, E. B. Evans and G. Sell. 1950, London: The Institute of Petroleum Pp. 340. 27s. 6d.

OVERSEAS CHEMISTRY AND INDUSTRY

SHORTAGES IN GERMANY

Agitation for Larger Chlorine Production

THE recent increase in demand—following a prolonged period of steadily mounting production—has found many chemical manufacturers in Western Germany unable to take full advantage of the new business available. Allied restrictions on chemical production and plant are chiefly blamed for the present difficulties and delays. There is little doubt, however, that increasing exports, especially of basic chemicals and dyestuffs, and financial impediments to a smooth flow of raw material imports are equally responsible for inconveniences experienced by German producers.

Much of the present business is, in any case, due to purchases for stock replenishment in anticipation of higher prices.

There has been a recent slowing of the expansion of the output of basic commodities, including coal and steel, the effect of which is likely to be felt shortly in the chemical industry.

Lignite as Motor Fuel

Lack of surplus coal has stimulated research into chemical uses of lignite. Though Germany's largest brown coal deposits are in the Soviet zone, there are substantial quantities in the Rhineland. Professor Drave has reported to experts of the German Coal Mining Directorate that lignite gasification by new, highly efficient processes is capable of yielding a gas consisting almost entirely of CO and H_2 suitable for producing motor spirit, diesel oil and solid hydrocarbon compounds, like paraffin wax, as well as alcohols and ammonia.

Gasification of lignite in the presence of an oxygen-steam mixture at pressures of 20-30 atm. yields a town gas of adequate quality in a single working process. According to Professor Drave this gas can be enriched to supply a cheap and satisfactory motor fuel.

The decision of the Allied High Commission to fix an output ceiling of 224,150 tons for chlorine has not been well received. This quantity corresponds to the present output capacity of the 11 existing chlorine-producing plants and is roughly in line with the actual production in Western Germany during 1948. It is argued that the production capacity should be increased by 20-30 per cent and that the Allied authorities should consent to such an expansion, particularly in view of the decision at the last Foreign Ministers' Conference to review existing arrangements concerning banned and restricted industries.

It is pointed out that there are now heavier demands on the electrolytic cells of the salt electrolysis plants than hitherto and this will cause them to wear out more rapidly. The restriction on chlorine will limit output of soda ash and other chemical manufactures which used these two substances as raw materials. It is now often impossible to meet all requirements of such chemicals.

Among producers complaining about the restrictions on chlorine production is Anorgana, Gendorf, the biggest chemical works in Bavaria. This company, formerly part of I. G. Farbenindustrie, also asserts that it cannot fulfil the objectives laid down in the Marshall Plan without allocation of substantially increased financial funds.

The scarcity of non-ferrous metals has been aggravated by shipping difficulties, *e.g.*, for imported pyrites. This causes many fabricators to accept new orders subject only to availability of raw materials. Some manufacturers even stipulate that the buyer must deliver scrap metals equal to the whole or part of the weight of the ordered objects. Under the influence of world high market prices, efforts are being made to increase mining and smelting of local ores, but the additional quantities so obtained are unimportant.

Copper Production

Kurhessischer Kupferschieferberghau GmbH is now producing about 100 tons of copper a month. The Lippewerk aluminium plant at Luenen, Westphalia, has resumed production at a rate of 10,000-12,000 tons a year and hopes to increase its output slightly by the end of the year, given adequate electric power.

In a new memorandum to the Allied High Commission the Federal Government requested that dismantling operations should be suspended at the Innwerk aluminium plant at Toeging, Bavaria. Production there is said to be at an annual rate of about 30,000 tons and could be

(*continued at foot of opposite page*)

INDIA PLANS SELF-SUFFICIENCY

Fertiliser Production Plans——U.S. Aids DDT Output

INDIA'S present needs and estimated future requirements of nitrogeous and phosphatic fertilisers, and the plans being made to increase their production in India, were discussed at a recent meeting in New Delhi, between representatives of the Ministry of Agriculture and other Government departments and of the fertiliser manufacturing industry.

Domestic requirements of ammonium sulphate for the next few years were estimated to be between 400,000 and 450,000 tons per annum, and they could be expected to rise to about 600,000 tons a year by 1955-56. The take-up would depend to some extent on the fertilisers being supplied to the cultivators at a reasonable price and on their being educated in the subject of soil fertility.

The need for this was illustrated by the fact that consumption of ammonium sulphate during the last year and a half had only been about 280,000 tons per annum.

Phosphatic Fertilisers

Ammonium sulphate was being manufactured at six units in the country, two of which produced it directly and four as a by-product. The possible output of the private firms manufacturing ammonium sulphate was about 80,000 tons per annum, but actual total production in 1949 had been only 46,000 tons.

Representatives of the industry mentioned that the Mysore and Travancore factories were to be expanded. The Mysore Government also had a scheme for the manufacture of ammonium sulphate at Bhadravati. The Indian Government fertiliser factory at Sindri would shortly be in production and was likely to reach its full output by the end of 1951.

About 14 plants in India were producing phosphatic fertilisers. These had a potential capacity of about 150,000 tons, but the actual production in 1949 had been 46,000 tons. Some improvement had been shown this year, and total output was expected to exceed 50,000 tons.

Domestic requirements of phosphatic fertilisers in the next few years were estimated at about 100,000 tons per annum, but 200,000 tons of superphosphates would be needed by 1955-56, in view of the expected consumption then of 600,000 tons of ammonium sulphate. Plans were in hand for the expansion of existing phosphatic fertiliser manufacturing units; a new factory was to be established in Bihar.

AN appeal to pharmacists in the State of Bombay to give more co-operation and encouragement to research in indigenous drugs was made by Dr. M. D. D. Gilder, Minister of Health, when he inaugurated the recent pharmaceutical conference in Bombay. A number of Indian firms manufactured vitamins A and D from materials available locally, but vitamins B and C were imported in bulk.

A project was being considered by the Government of India and the Government of Bombay for the manufacture of penicillin, sulpha- and the anti-malarial drugs. A suitable site had already been selected for a factory. Meanwhile, penicillin would be imported and bottled in India.

Dollar aid for India to establish a factory for the manufacture of DDT is being discussed by the Government and the headquarters of the UNICEF. It is believed that a contribution of $750,000 may be granted from U.S. sources.

The original request from India was for technical aid in establishing a penicillin factory, but UNICEF considered that the health problems not only of India, but other Far Eastern countries, would be better served by the production of DDT.

Ceylon and Pakistan have put forward similar suggestions for aid. The Indian factory will have to give part of its DDT production to UNICEF for distribution in Far Eastern countries.

SHORTAGES IN GERMANY

(*continued from opposite page*)

raised to approximately 40,000 tons if dismantling were stopped.

Fluorspar producers in the Palatinate report a substantial improvement, not only in domestic sales, but in exports. The demand from the United States and other non-European countries has greatly increased, so much so that some producers have surpassed wartime output figures.

Plans have been completed in Eastern Germany for the erection of a sulphuric acid plant with an initial capacity of 70,000 tons of SO_3, and orders have been placed for machinery and equipment. Anhydrite will be used as the raw material, and a new process will be employed. Production will begin in 1952. The plant will be located at Farbenfabriken Wolfen and its capacity may be doubled by 1955 if the new process proves satisfactory.

ITALY'S ORGANIC CHEMICAL INDUSTRY

Some Costly and Uncompetitive Production

HIGH costs, inefficient plant and uncoordinated production were among the problems retarding the development of the organic chemical industry to which attention was called in a recent survey made by Professor Arnaldo Corbellini.

High Prices

Italian prices were well above competitors, said the professor in an address to the chemical congress held at Milan earlier this year (*La. Chim. et l'Ind.*, 1950, *32* (9), 434-439). If this could not be remedied, Italy's exports might be so restricted that the chemical industry, and the manufacture of chemical plant, would become entirely dependent on the home market with such precarious protection as a tariff could afford.

The extent to which the Italian Government was likely to support the liberalisation of trade was not quite clear, but some greater protection for certain sections of the chemical industry was probable.

Regarding available home resources of raw material a distinction had to be drawn between the large scale organic industry catering for world wide markets and the numerous smaller concerns, the latter largely dependent on the by-products of coal, petroleum, natural gas, etc., exploited by the former. The lack of many basic materials was one of the main disadvantages besetting Italy's chemical industry.

The position was serious for the numerous smaller firms in Italy which had to depend largely on imported semi-manufactures. Their costs of manufacture were unavoidably high. Reference was made to the petroleum refineries, forming part of the OEEC plan for Europe, as one at least of the bright spots in Corbellini's rather gloomy picture. Methane or natural gas, in addition to its present principal use in Italy as fuel, could also become the basis of important organic industries.

Out-of-Date Plant

Another source of high costs in Italian organic chemical industry was the old and inefficient plant often still employed. Much of this could be remedied merely by adding another unit or by modifying some particular phase.

In the pharmaceutical section there appeared to be ample scope for reform, as its present structure tended to be very uneconomic. There was too much uncoordinated subdivision, the manufacture of a particular product being subdivided among numerous small and inefficient factories, and too many lines were attempted. There should be more rational selection. It would be better to manufacture a few products well and cheaply rather than several badly and expensively.

The situation regarding technical and scientific staff and chemical workers generally was also considered unsatisfactorily extravagant.

Spanish Steel Plans

THE Spanish Government, undeterred by the opposition of the country's iron and steel industry, has carried out its decision to set up a national corporation, the Empresa Nacional Siderurgica, the expressed aim of which is to double Spain's iron and steel output. The corporation is to erect a new plant in the Asturian industrial region in the vicinity of the ports of Gijon-Musel and Aviles. This is to turn out some 200,000 metric tons of crude steel at the end of the first constructional stage, and the capacity output, to be reached in about ten years, is estimated to aggregate 600,000 metric tons per annum.

The corporation, formed with the aid of the Government Instituto Nacional de Industria, is to be transferred to private interests at a later date. The belief that U.S. interests would participate in this scheme has not been confirmed.

The country's three leading iron and steel manufacturing concerns, Vasconia, Duro Felguera and Altos Hornos, which control together about 70 per cent of the total output, have observed the scheme with little enthusiasm. It is being pointed out in industrial quarters that existing plants are sufficient to re-establish the 1929 production figure, and even to exceed it, as the maximum capacity then amounted to 1 million metric tons. In 1929, a peak output of both steel (1,003,450 tons) and pig-iron (748,936 tons) was achieved. Much concern is being voiced in the old industrial region of Biscey on account of the exhaustion of the iron-ore deposits around Bilbao and Santander which, if not replaced, would completely alter the raw material position of the industry.

AMERICAN RUBBER

Commercial Possibilities of Guayule

SLOW but definite progress is being made towards the production of natural rubber within the United States. New high-yielding strains of the rubber plant guayule, a shrub that grows wild on the dry table lands of Mexico and Texas, have been developed. The new strains, according to the U.S. Department of Agriculture, are the result of an intensive breeding programme begun in 1942, and yield from 25 to 40 per cent more rubber than the best of the guayules produced during the war. One is a hybrid that breeds true from seed and carries the first generation hybrid vigour into succeeding generations without loss.

Research to explore crop possibilities in Mexico and Texas showed that guayule could be grown under irrigation as well as on dry land.

During the war guayule was grown in the United States under irrigation. Harvested at the end of two or three years it provided natural rubber at a cost justified only by the emergency. Continued study since the war, however, has shown that guayule has important possibilities for dry-land farming. Some 2 million acres in Texas in the low rainfall area may prove suitable for growing guayule.

Pilot plantings have been established in five locations in California to test new varieties and hybrids. These will determine the adaptability of guayule to varying soils and climates and give information on yields and costs of production. It is believed that seedlings of the new strains will produce about 1200 lb. of rubber per acre in five years.

Liquid Nitrogen for Pulverisation

A NEW method developed by the Linde Air Products Company (a unit of the Union Carbide and Carbon Corporation) utilises liquid nitrogen to provide rapid and effective pulverising of materials normally difficult or impossible to grind. The new technique employs liquid in spray form, and is said to cool the material rapidly to a point of maximum fragility and thereby reduce the amount of energy required to disintegrate it. It is claimed that the new process promises to accelerate the high-speed pulverisation of mechanically-hard or heat-sensitive materials such as plastics, insecticides, substances containing vitamins, and other organic materials.

U.S. CHEMICAL ENGINEERS

Wide Range of Activities

ABOUT 1500 engineers and executives of the chemical and allied industries are expected to take part in the 43rd annual meeting of the American Institute of Chemical Engineers to be held at Colombus, Ohio, from December 3-6. Forty-two papers, covering glass manufacture, viscous materials, phase equilibria, air pollution, ultrasonics, and many other topics, will be presented.

Four papers, dealing with glass processing, will cover refractories problems in the industry, glass as a material for the chemical industry, the fracturing of glass, and chemical engineering aspects of flat glass, glass block, and Foamglas.

Engineering for Plastics

The processing of viscous materials, such as lubricants, syrups, etc., will be discussed in another session of four reports. Two will deal with practical mixing techniques and heat-transfer problems; another will survey factors in the processing of sugar products and molasses. Engineering calculations for a psuedo-plastic fluid will be presented for the first time, in a paper dealing with pressure drop of fluid polystyrene in conduits.

Vapour-liquid equilibria will be one of the main topics at the symposium of eight papers on phase equilibria.

Air Pollution Control

The new awareness of the need for air-pollution control is reflected by the inclusion of six papers, three being contributions to the study of air pollution by the investigation of air pollution by particulate matter, the sampling of contaminants above ground level, and actual observations on dispersion from short stacks. The Oak Ridge National Laboratory will provide an entirely modern treatment concerning the disposal of radioactive gases. A general survey will be given of air-pollution control in the chemical industry, and two papers will discuss electrostatic and sonic precipitation, and the performance of industrial aerosol filters.

Among the general papers will be a Bureau of Mines report on liquid-phase hydrogenation of coal at low pressures (1500 psig.), data on a new catalyst for de-alkylation of aromatic hydrocarbons (alumina activated with anhydrous HF), and a special report on a continuous cold rubber process.

OVERSEAS

German Plans for I.G. Farben

Reorganisation of the I.G. Farben chemical combine into three main groups based on the principal plants at Ludwigshafen, Frankfurt, and Leverkusen is proposed by the Federal German Government in plans submitted to the Allied High Commission.

I. G. Farben is at present in process of being liquidated. The German scheme is for various smaller plants to be attached to the main three on a geographical basis. A number of isolated Farben plants would be reorganised under entirely separate management. By this means the Germans contend that the combine would be split into sufficiently small units to satisfy Allied anti-cartel legislation.

General acceptance of these plans by the Allied authorities is considered likely and the reorganisation may well be under way by Christmas.

Proposals have also been completed by experts representing Allied and German views and these are also to be scrutinised by the Allied High Commission.

Indian Chemical Imports

The conclusion that India has continued to hold her position during the post-war years as the largest market for United Kingdom chemicals, drugs, dyes and colours is put forward in *Indian Trade and Industry* (October 6, published by the Commerce Department of the High Commission of India). In a summary of the main categories of Indian imports from the U.K., the review shows the total of chemicals, etc., has risen in value from £2.8 millions in 1938 to £9.3 m. and £9 m. in 1947 and 1948 and in 1949 reached £10.2 m. Generally, British share in consumer and capital goods trade in India has shown a small but continuous decline since 1947.

India's drive for fuller industrialisation is reflected in the fact that the other marked exception to the downward trend, in addition to chemicals, was machinery the value of which in the last three years was (in £ millions) 29.8, 33.6 and 38.9. In 1938 machinery for India realised £7.8 million.

China Stops Wolfram Exports

Wolfram exports from China have been barred by the Communist authorities in Canton. The Hong Kong market is said to be practically without supplies and the whole of the wolfram supplies of South China are now being sent to Russia under a barter treaty.

U.S. Non-Ferrous Metals

Demand for all non-ferrous metals continues in the U.S.A. and is in excess of available supplies. Stocks of zinc are now the lowest for 25 years, although domestic output is the highest for six years, while any surplus that previously existed in lead stocks has now been eliminated.

Copper also remains scarce and a U.S. Government Order establishing the quota of copper output to be used for defence purposes is expected shortly. It is expected to be modelled on lines similar to the Order issued for steel. Makers do not anticipate that they will have to contribute more than 20 to 25 per cent of copper supplies for defence purposes.

A reduction of about 35 per cent in the non-military use of aluminium beginning in January, was ordered by the Government on November 13. More than 30 per cent of the supply of aluminium was needed for the present defence programme, including reserve stocks, according to Mr. William M. Harrison, Administrator of the National Production Authority.

Brazilian Manganese

Since the U.S.A. was denied its Russian source of manganese ore in 1949, there has been much interest in the possibility of stimulating the export by Brazil of this ore in competition with India and South Africa. The State of Sao Paulo draws supplies for its steel industry from the Mines of Minas Geraos, but the capacity of the railways is insufficient to increase by a wide margin the quantities transported to the coast for shipment. Total Brazilian production during the last few years has averaged about 182,000 tons per annum, of which some 32,000 tons have been consumed in domestic industry and the remainder exported. However, in the first quarter of this year, exports rose to an average of 16,250 tons per month. If this rate is maintained total exports for the year will show a useful increase over the 1949 total of 150,000 tons.

Australian Lead Mine Project

Plant to treat 80 tons of lead daily and progressively to increase that output will be erected at the Prothero lead mine, Northampton, Western Australia. The mine, which is claimed to be exceptionally rich, has been acquired by Anglo-West Australian Mining in which American Smelting, Mount Isa, Mining Trust and Terra Nova Properties are interested.

· PERSONAL ·

MR. S. J. L. HARDIE has resigned as chairman and as a director of British Oxygen Co., Ltd., in view of his appointment as chairman of the Iron and Steel Corporation of Great Britain. The vice-chairman of the company, MR. J. S. HUTCHISON, has been elected chairman, and MR. F. C. S. LEWIN-HARRIS and MR. JOHN L. HARDIE have been appointed to the board.

At the annual general meeting of the British Colour Makers' Association the following officers and council were appointed for the ensuing year:—Chairman: MR. H. GOSLING (Cornbrook Chemical Co., Ltd.); vice-chairman: DR. H. SAMUELS (I.C.I., Ltd.); hon. treasurer: MR. C. G. A. COWAN (Cowan Bros. (Stratford), Ltd.); Council: MR. C. M. BEAVIS; MR. F. BURRELL; MR. H. GOSLING; MR. J. H. GRIMSHAW; DR. H. SAMUELS; MR. V. WATSON; MR. H. A. WILSON; and MR. C. E. YOUNG; secretary: MR. A. J. HOLDEN. MR. J. H. GRIMSHAW (Horace Cory & Co., Ltd.), the retiring chairman, presided at the association's first annual dinner, at which the toast of the association was proposed by MR. J. DAVIDSON PRATT, director and secretary of the ABCM.

DR. BERNARD RAISTRICK has been appointed research manager of the new central research department for fertilisers which Scottish Agricultural Industries, Ltd., is to establish in the Edinburgh area. He will take up the appointment on January 1, 1951. Dr. Raistrick is at present assistant director of research with Albright & Wilson, Ltd. The new department will be engaged mainly on research into problems of the manufacture of phosphatic and other fertilisers.

MR. PERCY A. HOLT, joint managing director of Bradford Dyers' Association, Ltd., has been appointed president of its Canadian company, Bradford Dyeing Association (Canada), Ltd. He will maintain his headquarters at the Bradford offices of the BDA, with which he has been associated since 1922.

MR. E. S. WADDINGTON, of the industrial department of Philips Electrical, Ltd., has been appointed by the Institute of Welding to the British Standards Institution's technical committees PSM/8 and PSM/8/1.

MR. HARRY IBBETSON, at present general secretary of the Textile Institute, Manchester, will shortly be relinquishing that position to take up the secretaryship of the International Wool Secretariat, in London.

The following assistant chief engineers have been appointed to the general engineering department of Metropolitan-Vickers Electrical Co., Ltd.: MR. F. B. HOLT (Industrial), MR. D. R. LOVE (Mining) and MR. W. J. PRICE (Power).

November 13 marked the centenary of the birth of SIR JOHN WILLIAMS BENN, founder of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE.

MR. ERNEST T. NEATHERCOAT, chairman and managing director of Savory & Moore, Ltd., and associated companies and formerly president of the Pharmaceutical Society of Great Britain, left £163,967 (duty paid £35,488).

MR. G. W. HESLETT, chief estimating engineer of Sulzer Bros. (London), Ltd., has been appointed manager of its pump department.

Royal Institution Lectures

THE annual series of lectures before Christmas given at the Royal Institution, Albemarle Street, London, covers the usual number of interesting subjects. Crystallography in modern science is the subject of a course being held on Tuesdays at 5.15 p.m., the last of which, on November 21, deals with crystallography in chemistry and is being given by J. Monteath Robertson, Gardiner Professor of Chemistry, University of Glasgow. Another course of four lectures which is to be given on Thursdays this month is by L. R. G. Treloar on "The Physics of Rubber Like Materials."

Obituary

The death has occurred of MR. CHARLES GANDY, chairman of the National Smoke Abatement Society. He originated the conception, in 1935, of smokeless zones in towns which, in ten years, was endorsed by a Government committee, and has now been incorporated in a growing number of local Acts of Parliament.

HOME

Midlands Building Exhibition

THE CHEMICAL AGE will be represented at the Midlands Building Trades' Exhibition at Bingley Hall, Birmingham, on February 14-24, 1951.

Developing New Dyestuffs

The efforts of chemists and technologists to discover, produce and promote the use of new dyestuffs was apt to be taken for granted said Mr. H. B. Bradley of I.C.I., Ltd., speaking in Manchester last week. Research on a very extensive scale was continually being carried out for the benefit of industry.

FBI Overseas Scholarships

A young electrical engineer from Chile recently arrived in this country for a course of practical works training, is the first of 100 graduates to be offered engineering scholarships under a scheme of the Federation of British Industries. Scholarships are offered for two-year periods and students are chosen by a local overseas selection committee representing the FBI and the Government concerned.

Some Polythene Bags Tax-Free

In consultation with the British Plastics Federation, the Customs authorities have decided that, for an experimental period of six months, bags made wholly of polythene film, not exceeding .002 in. in thickness shall be exempt from purchase tax. Polythene bags exceeding .002 in. in thickness remain chargeable with tax at the rate of 66⅔ per cent of the wholesale value.

Technical and Scientific Employment

The total number of persons enrolled on the Technical and Scientific Register at September 11, was 5747, which included 3960 registrants is work but desiring a change of employment, and 1787 unemployed. During the four-week period August 15 to September 11, 816 vacancies were notified by employers to the appointments offices, 284 were filled, and 713 cancelled or withdrawn.

Reaction in Tin

After a sharp rise to the high level of £1,280 for cash on November 7 prices have closed below the best. After a new record of £1,300 a ton on November 8 cash was finally more than £20 down. Following further setbacks there were some gains on November 13, the cash price being £1107 10s. The market on November 14 was quiet, cash quotation being £1075 and three months £1035-£1040.

Branch Office

Richard Sutcliffe, Ltd., announces the address of its Newcastle-on-Tyne office is 17 Sandhill.

New Cement Works

The Minister of Town and Country Planning has granted conditional permission for British Portland Cement Manufacturers, Ltd., to erect a new works at Cauldon Low, a spot noted for its rural beauty, near Cheadle, Staffs.

Glass Plant Expansion

A project to double the production capacity of its Birmingham works was announced last week by the Triplex Safety Glass Co. Mr. Arthur Cochrane, assistant managing director, said it was hoped the work would be completed by the end of 1951. Cost of the extensions, excluding plant and machinery, would be £80,000. No additional capital would be raised.

Coal Production

Output of coal last week was slightly higher than in the previous week but substantially less than in the corresponding week last year. Comparative figures are: Last week: 4,422,100 tons (deep-mined 4,171,300 tons, opencast 250,800 tons). Previous week: 4,393,700 tons (deep-mined 4,152,600 tons, opencast 241,100 tons). Week ended November 12, 1949: 4,477,100 tons (deep-mined 4,251,100 tons, opencast 226,000 tons).

Mechanical handling equipment leaving Ossett station, near Wakefield, Yorkshire, for Spain. Only about half the train can be seen in the picture. The order was supplied by Richard Sutcliffe, Ltd., and was valued at more than £100,000.

The Stock and Chemical Markets

STOCK markets have been more active recently. There has been a tendency for business to concentrate more on industrial shares, which remained firm. This is in contrast to commodity shares and British Funds, which lost part of recent gains. It is assumed that most industrial companies will be able to maintain dividends, and a number of small increases are expected over the next few months. It is unlikely that there will be any breakaway from the present policy of moderate dividend payments. Industrial shares offer quite attractive yields, and where company activities centre on export trade or rearmament, dividends should be maintained in 1951 despite further possible increases in taxation.

The favourable yields offered at current prices tended to draw more attention to chemical shares. Imperial Chemical have been active around 43s. 3d., partly on the news that the company is to produce Terylene. Although plant for this new textile fibre will cost several millions, no further increase in I.C.I. capital is expected. It is believed that the company will be able to maintain the 10 per cent dividend in future despite the interest requirements of the loan stock issued earlier this year.

Monsanto 5s. shares have been firm at 51s., Laporte Chemicals 5s. units were 10s. 3d. and Fisons, at 29s., remained firm on the good impression created by the full report and accounts. W. J. Bush have risen to 91s. 3d. on the share bonus, which is welcomed in the City because it will increase the number of shares in issue. This will widen the market in these shares, at present somewhat restricted because the shares are usually firmly held.

Albright & Wilson firmed up to 30s. 3d., Brotherton 10s. shares were 20s. 6d., Bowman Chemical 4s. shares, 6s., Boake Roberts, 34s. 9d., F. W. Berk, 12s. 9d., Amber Chemical 2s. shares, 2s. 9d., Pest Control 5s. shares. 7s. 4½d., and British Chemical & Biologicals 4 per cent preference, 16s. L. B. Holliday 4½ per cent preference were 19s. 9d., and Woolley 4¾ per cent debentures, 104½.

Glaxo Laboratories rose to 57s. on the full results and annual statement. The authorised capital is being increased and it is assumed that when more money is required it will be raised by an issue to shareholders on attractive terms. Triplex Glass have been active up to 28s. on the plan to double the output of the Birmingham works. This will not involve any increase in capital and has aroused hopes that a further increase of dividend may be in prospect.

United Molasses were easier at 46s. 3d. on conflicting views as to the effect of the rising price of molasses on the company's world-wide business. The 4s. units of the Distillers Co. held firm at 19s. 9d., and shares of plastics companies were again more active. British Xylonite were 85s. 7½d. and British Industrial Plastics 2s. shares were 6s. 7½d. Kleemann have continued to fluctuate around 9s. 7½d. following publication of the financial results. British Oxygen were good at 85s. 7½d. "ex rights" to the new shares, which were 19s. premium over the offer price. It is believed that there are good prospects of the dividend being maintained on the larger capital. The terms of the Dunlop Rubber share offer to shareholders are expected next week. British Glues 4s. shares have been firm at 22s. and Boots Drug were 49s. 9d.

Among iron and steels, Guest Keen at 49s. 9d. continued active on market assumptions that the dividend total is likely to be raised. Oil shares failed to hold all earlier gains, but remained more active.

Market Reports

BUSINESS on the industrial chemicals market during the past week has been brisk, and in most sections, more especially the heavy chemicals, new bookings have been fairly substantial. The overall demand for export has been sustained and in some directions supplies are reported to be difficult to negotiate. The call for potash compounds remains persistent and the whole range of soda products continues active, but no change in makers' prices has been recorded. Cream of tartar, hydrogen peroxide, bleaching powder, barium chloride, arsenic and formaldehyde are all in active request, and among the non-ferrous metal compounds white and red leads are being called for at the higher prices now ruling. The increased rates for glycerine have not restricted the demand and supplies of both the crude and refined are finding a ready outlet. A strong undertone prevails on the coal tar products market, with the home and export demand for creosote oil and cresylic acid continuing brisk. Pitch is also moving well with

(continued at foot of following page)

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

A. S. BREWER & CO. (PLASTICS), LTD., London, E.C. (M., 18/11/50). October 10, £1500 deb., to Branch Nominees, Ltd.; general charge.

POULTEN, SELFE & LEE, LTD., London, E., glassware manufacturers. (M., 18/11/50.) October 14, £3000 mort. to Hastings Permanent Building Society; charged on properties in Wickford. *Nil. June 21, 1949.

Satisfaction

FREDK. BOEHM, LTD., London, W., manufacturers of oils, fats, etc. (M.S., 18/11/50). Satisfactions October 17 of debentures registered June 20, 1933 and October 29, 1936.

Increases of Capital

The following increases of capital have been announced: ASTELL LABORATORY SERVICE CO., LTD., from £2000 to £5000; WATTEN EMULSIFYING MACHINES, LTD., from £5000 to £15,000.

Company News

British Celanese, Ltd.

Net profit on the year's trading to June 30 of British Celanese, Ltd., is announced at £1,562,048. A dividend of 10 per cent for the year on the ordinary stock has been declared. The 31st annual general meeting is to be held on November 30.

British Chemicals and Biologicals, Ltd.

Trading profits of the group for the year ended June 30, £236,835 (£181,179). Net profit of British Chemicals and Biologicals £73,374 (£39,700). To general reserve £50,000 (nil).

Calor Gas Holding Co., Ltd.

Net profit of Calor Gas Holding Co., Ltd., for year ending July 31, is announced as £79,567. A final ordinary dividend of 20 per cent has been declared, making a total of 32½ per cent for the year.

Evans Medical Supplies, Ltd.

An interim dividend of 3 per cent has been declared on the ordinary stock of Evans Medical Supplies, Ltd., for the year ended December 30.

Fisons, Ltd.

Substantial changes are recorded in the report of Fisons, Ltd., for the year ended June 30. Total assets are now £15,560,071 (£9,403,139). Additional funds from issues made in September 1949 and March last are not fully deployed, but cash holding is increased from £98,000 to £2 m. Group trading profits £1,233,724 (£707,438). Government restriction on the supply of sulphuric acid is affecting the current production programme.

Glaxo Laboratories, Ltd.

Consolidated trading profit of Glaxo Laboratories, Ltd., for the year ended June 30, was £2,711,511 (£1,960,996). Research outlay alone was ten times greater than before the war. The authorised capital is to be doubled to a total of £3 m. No immediate issue is contemplated. The final ordinary dividend of 12½ per cent will make a total of 17½ per cent for the year.

THE STOCK AND CHEMICAL MARKETS

(continued from previous page)

an increasing call for shipment. The light distillates remain steady and unchanged.

MANCHESTER.—There has been a fairly active inquiry during the past week in the Manchester chemical market, on both home and export account. Interest has been displayed in a wide range of products. Instructions for delivery under existing contracts have been on a substantial scale and have included bleaching, dyeing and finishing chemicals and other bread-and-butter lines. Values are on a firm basis in nearly all sections. There is a good demand for basic slag and one or two other fertiliser items, including compounds. The call for most tar products has been on a steady scale.

GLASGOW.—Business in the Scottish heavy chemical market has been steady during the past week but prices continue to increase. There has been no change in the export position.

Next Week's Events

MONDAY, NOVEMBER 20

Royal Institute of Chemistry

Leeds: University, 6.30 p.m. Annual general meeting. Dr. H. J. T. Ellingham: "Chemical Energy."

Electrodepositors' Technical Society

London: Northampton Polytechnic, St. John Street, E.C.1, 6 p.m. T. Dennison: "The Manufacture and Fabrication of Steel with Special Reference to Surface Quality" (illustrated by Technicolour sound film).

Société de Chimie Industrielle

Paris: International Analytical and Experimental Chemistry Congress (until Nov. 24). Secretary: 28 Rue St. Dominique, Paris, 7.

TUESDAY, NOVEMBER 21

Society of Chemical Industry

Liverpool: University, 6.30 p.m. Castner Memorial Lecture. Dr. Christian Aall: "Electrothermics and Electrothermal Processes."

London: Burlington House, Piccadilly, W.1, 6.30 p.m. (Plastics and Polymer Group—Faraday Society invited). W. Reddish (I.C.I., Ltd., Plastics Division): "Dielectric Properties of Terylene."

London: Royal College of Science, S.W.7, 5 p.m. (Agricultural Group). H. Trefor Jones: "Magnesium as a Plant Nutrient."

Chemical Engineering Group (SCI)

London: Burlington House, Piccadilly, W.1, 5.30 p.m. Dr. R. Holroyd: "Some Aspects of Semi-technical Scale Experimentation in Chemical Industry."

Royal Institute of Chemistry

Welwyn Garden City: The Cherry Tree, 8 p.m. (With Welwyn Garden City Scientists' Club.) Dr. H. P. Koch: "Some Applications of Infra-red Spectroscopy to Organic Research."

The Royal Institution

London: 21 Albemarle Street, W.1, 5.15 p.m. J. Monteath Robertson: "Crystallography in Chemistry."

WEDNESDAY, NOVEMBER 22

Society of Chemical Industry

London: National Institute for Medical Research, Mill Hill, 6.15 p.m. (Food Group, Microbiological Panel.) "Recent Aids to the Study of Microbiology," introduced by Sir Alexander Fleming. "The Electron Microscope," Dr. W. J. Elford; "Phase Contrast Microscopy," D. A. Tanfield and Dr. W. H. Hughes.

Institute of Chemistry of Ireland

Dublin: University College, 7.45 p.m. Presidential address, A. G. G. Leonard: "I Remember—."

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 2.30 p.m. Albert Parker: "Cities Without Smoke."

Plastics Institute

Glasgow: 39 Elmbank Crescent, 7.30 p.m. R. G. Farnsworth: "Thermosetting Moulding Materials and Recent Developments."

Fuel Efficiency in Industry and Home

Manchester: City Hall, Deansgate. Exhibition (until December 2).

THURSDAY, NOVEMBER 23

The Chemical Society

Bangor: University College of North Wales, 5.45 p.m. Tilden Lecture. Dr. F. L. Rose: "A Chemotherapeutic Search in Retrospect."

Edinburgh: North British Station Hotel, 7.30 p.m. (With RIC and SCI.) Prof. D. H. Hey: "Homolytic Aromatic Substitution."

Liverpool: University, 4.30 p.m. (With RIC, SCI and BAC.) Prof. R. D. Haworth: "The Chemistry of Tropolone and Some of its Derivatives."

Royal Institute of Chemistry

Bristol: University, 8 p.m. (With the Chemical Society and SCI.) Dr. D. W. Kent-Jones: "Cereal Chemistry."

Chatham: Sun Hotel, 7.30 p.m. Dr. N. O. Clark: "Chemistry and Fire Fighting."

Plastics Institute

London: Waldorf Hotel, Aldwych, W.C.2, 6.30 p.m. N. G. H. Thomas and D. G. Cavanagh: "A Survey of Polystyrene Developments."

Institute of Fuel

London: Institute of Mechanical Engineers, Storey's Gate, S.W.1, 5.30 p.m. Dr. J. A. Cooper and L. W. Young: "The Performance and Efficiency of an 800-lb./sq. in. Pulverised-Fuel-Fired Boiler Plant over a Period of 20 Years."

FRIDAY, NOVEMBER 24

The Chemical Society

Newcastle-on-Tyne: King's College, 5 p.m. Reading of Original Papers.

St. Andrews: United College, 5 p.m. Prof. D. H. Hey: "Homolytic Aromatic Substitution."

(continued at foot of following page)

New Companies Registered

Nu-Air Products (London), Ltd.
Private company. (487,992). Capital £100. Manufacturers of air freshening products and other deodorants of all types, etc. Subscribers: R. G. Baxter and E. A. Dodd. Reg. office: 1 Balfour Place, W.1.

Kylon, Ltd.
Private company. (487,916). Capital £10,100. To develop, manufacture and market biological, pharmaceutical and chemical preparations and appliances. Directors: Ernest F. Budd, Robt. Fraser, Otto Koblitz and Andrew W. Letts. Reg. office: Central House, Finsbury Square, E.C.2.

Medical Gases, Ltd.
Private company. (487,762). Capital £10,000. Manufacturers of medical gases, oxygen, drugs, medicines, chemical fertilisers, etc. Subscribers: H. Goodwin and J. McIndoe. Managing director: W. R. Smith. Reg. office: 121 Clarendon Street, Hull.

Micro-Nutrients Holdings, Ltd.
Private Company. (487,360). Capital £100. Objects: To acquire and exploit patent rights, formulae, etc., in connection with industry, foodstuffs, agriculture, etc. Director: C. Townsend. Reg. office; 448 Strand, W.C.2.

J. W. Sutcliffe & Co. (1950), Ltd.
Private company. (486,088). Capital £10,000. Manufacturers of bottles, carboys, etc. Directors: T. C. Sutcliffe, C. T. Sutcliffe, J. E. Sutcliffe, and L. C. Cox. Reg. office: 12 Gt. Portland Street, W.1.

Whitfield (Engineering) Chemical Co., Ltd.
Private company. (485,521). Capital £2500. Objects: To acquire the business of chemical manufacturers and sheet metal workers heretofore carried on by Whitfield Chemical Works at 79 Blackman Lane, Leeds. Director: G. Johnson, 11 Raynel Gardens, Leeds, 6. Reg. office: 79 Blackman Lane, Leeds.

Weldyne Plastics, Ltd.
Private company. (487,808). Capital £100. Designers and manufacturers of industrial or general thermoplastic welded articles. Directors: Sydney McGregor, director of Radyne, Ltd., etc.; Jas. F. Cullingham, Edmund C. Stanley and Christopher E. M. Tibbs, all directors of Radio Heaters, Ltd. Reg. office: 42 Bedford Avenue, W.C.1.

Noso Products, Ltd.
Private company. (488,138). Capital £2500. Manufacturers, importers and exporters of and dealers in all types of chemical products, adhesives, oils, colours, varnishes, dyestuffs, etc. Directors: F. W. Parr and S. G. Burgess. Reg. office: 120 Bute Street, Cardiff.

Lantigen (Export), Ltd.
Private company. (488,120). Capital £1000. Manufacturers, distillers and refiners of vaccines, sera, pharmaceutical, medicinal, chemical and industrial preparations and articles. Subscribers: J. Stanners and Mrs. J. G. Stanners. Reg. office: 'Pinewood,' College Road, Bagshot, Surrey.

Camot Products, Ltd.
Private company. (488,066). Capital £5000 in 2000 6 per cent cumulative preference and 2000 ordinary shares of £1 each, and 4000 founders' shares of 5s. each. Objects: To carry on the business of manufacturers of and dealers in various products, including tools, greases, oils, soaps, etc. Directors: Arthur E. Temple and Arthur G. Temple, both of 12 Osborne Gardens, Monkseaton; Chas. P. MacCarthy (managing director) and Franklin Scott. Solicitors: Smirk & Thompson, 86 Pilgrim Street, Newcastle on Tyne.

NEXT WEEK'S EVENTS

(continued from previous page)

FRIDAY, NOVEMBER 24

The Royal Institution
London: 21 Albemarle Street, W.1, 9 p.m. Sir Edward Appleton: "The Sun as a Radio Emitter."

Royal Institute of Chemistry
Glasgow: Royal Technical College, George Street, 7.15 p.m. Prof. D. H. Everett: "Electrostatic Forces in Chemistry."

Institution of Plant Engineers
Birmingham: Imperial Hotel, 7.30 p.m. R. Bramley-Harker (H.M. Inspector of Factories): "The Plant Engineer and the Factories Act."

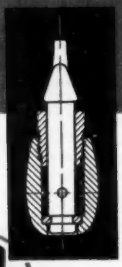
SATURDAY, NOVEMBER 25

Royal Institute of Chemistry
Wrexham: 6.30 p.m. (North Wales Section). Prof. M. Stacey: "Advances in Carbohydrate Chemistry."

A NEW

Klinger

"SLEEVE-PACKED" COCK



The AB. 10 Cock to replace small Taper Plug Cocks for Pressure Gauges, Air Reliefs, Drains, Instrument Connections, Compressed Air, Gas and Hydraulic Controls and similar equipment.

Machined from brass and polished all over, this is a simplified design, with the minimum of components, based on our world renowned " Sleeve-Packed " principle.

Tested hydraulically to 1,000 p.s.i., it will give reliable service and easy maintenance with long life under the most exacting conditions. Offered at prices comparable to ordinary unpacked fittings.

AVAILABLE IN SIX DIFFERENT PATTERNS

Cock Bore 5/32". With male and female screwed connections, with or without union ends

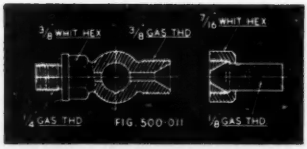


FIG. 500.011 *Screwed ¼" B.S.P. Male with ⅜" union connection on the other end.*

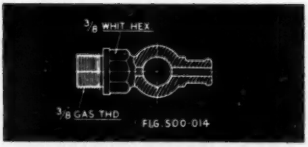


FIG. 500.012 *Screwed ⅜" B.S.P. Male with ⅜" union connection on the other end.*

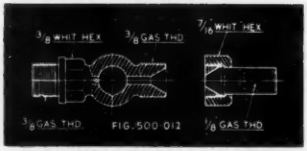


FIG. 500.013 *Screwed ¼" B.S.P. Male with plain nipple at other end. (Suitable for discharge to atmosphere or small hose connection).*

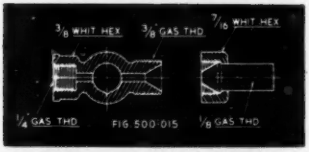


FIG. 500.014 *Screwed ⅜" B.S.P. Male with nipple at other end. (Suitable for discharge to atmosphere or small hose connection).*

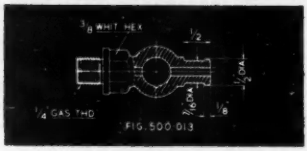


FIG. 500.015 *Screwed ¼" B.S.P. Female with ⅜" union connection on other end. (Suitable for pressure gauges).*

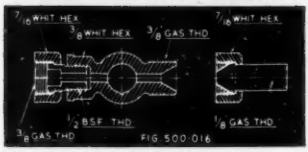


FIG. 500.016 *Screwed ⅛" B.S.P. Female (loose nut connection) with ⅜" union connection. (Suitable for pressure gauges).*

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Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Nephelometers.—Evans Electroselenium, Ltd., and G. C. Collins. Sept. 16 1949. 645,511.

Method and apparatus for the electrolytic coating of metal strip.—W. W. Triggs. Sept. 28 1948. 645,546.

Catalytic treatment with hydrogen of glyceride oils.—Lever Bros. & Unilever, Ltd. Oct. 4 1948. 645,551.

Infra-red gas analysing apparatus.—C. A. Parsons & Co., Ltd., and A. E. Martin. Sept. 22 1949. 645,575, 645,576.

Wool dyeing process.—I.C.I., Ltd., D. R. Lemin, and I. D. Rattee. Oct. 24 1949. 645,594.

Working hard glass bodies by electric heating.—Corning Glass Works. Nov. 8 1948. 645,521.

Production of melamine.—British Oxygen Co., Ltd., J. W. Haworth, and M. G. Cooper. Oct. 25 1949. 645,600.

Purification of aqueous solutions of formaldehyde.—British Celanese, Ltd. Nov. 10 1948. 645,601.

Sintering of iron ore.—United Steel Co., Ltd., G. D. Elliot, and F. Dunhill. Dec. 19 1949. 645,523.

Detection of leakage into vacuum systems.—Metropolitan-Vickers Electrical Co., Ltd., J. Blears, and J. H. Leck. Nov. 28 1949. 645,526.

Metallurgical processes for producing materials or articles of platinum or allied metals, or their alloys, and materials or articles made by or from the products of such processes.—Lodge Plugs, Ltd., and C. J. Smithells. Dec. 10 1945. 646,002, 646,003, 646,004.

Process for the manufacture of polymethine dyestuffs.—Gevaert Photo-Producten, N.V. April 12 1946. 646,123.

Apparatus for incorporating air or other gases into soap.—D. E. Marshall. April 30 1946. 646,008.

Coloured photographic layers.—Gevaert Photo-Producten, N.V. April 12 1946. 646,125.

Electron microscopes.—N.V. Philips' Gloeilampenfabrieken. Jan. 2 1947. 646,019.

Preparation of antispasmodic agents.—Winthrop-Chemical Co., Inc. Jan 24 1947. 646,198.

Artificial carbons for electrical and other uses.—Soc. Le Carbone-Lorraine. Feb. 4 1947. 646,023.

Removal of carbon dioxide in the separation of oxygen from air.—J. C. Arnold. (Standard Oil Development Co.). March 17 1947. 646,199.

Sensitizing of photographic emulsions and to the preparation of dyestuffs therefor.—Gevaert Photo-Producten, N.V. and Dormatl. May 3 1948. 646,137.

Process for the production of acid nitriles.—A. Abbey. (Armour & Co.). May 19 1947. 646,202.

Manuacture of basic esters of 1-arylcyclo-alkyl-1-monothio-carboxylic acids.—L. E. Jones. (J. R. Geigy Soc. Anon.). May 26 1948. 646,204.

Preparation of pteridines.—American Cyanamid Co. July 11 1947. 646,149.

Colloidal aqueous dispersions and methods of preparing same.—American Cyanamid Co. July 25 1947. 646,205.

Manufacture of derivatives of aminocarboxylic acids.—I.C.I., Ltd., W. Baird, E. G. Parry, and S. Robinson. July 14 1948. 646,033.

Thermoplastic synthetic resinous materials.—Crystalate, Ltd., and J. Lesser. Oct. 28 1948. 646,162.

Toxicants.—Nuodex Products Co., Inc. Oct. 20 1947. 646,207.

Treatment of Brewers' worts.—A. P. V. Co., Ltd., R. Seligman and S. W. T. Paine Oct. 6 1948. 646,208.

Processes for the prevention of corrosion and compositions therefor.—Shell Refinery & Marketing Co., Ltd. Oct. 30 1947. 646,209.

Phenolic resins and laminated insulating material bonded therewith.—E. H. G. Sargent. Nov. 5 1948. 646,170.

Manufacture of vat dyestuffs.—Ciba, Ltd. Nov. 18 1947. 646,171.

Process for the production of fluoranthene and its derivatives.—E. Bergmann. Nov. 18 1948. 646,214.

Manufacture of 2-Chloro-benzothiazoles.—Kodak, Ltd. Nov. 20 194. 646,045.

Manufacture of hydrophenanthrene derivatives.—Ciba, Ltd. Nov. 22 1947. 646,046.

Surface hardening of mild steel.—Soc. Anon. De Commentry-Four-Chambault & Decazeville. Nov. 28 1947. 646,069.

Manufacture of pyrimidylmercapto-carboxylic acids and derivatives thereof.—Ciba, Ltd. Dec. 4 1947. 646,070.

(*continued on page* 732)

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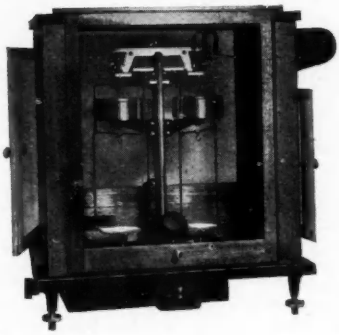

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Dialkylaminoalkyl ethers of certain polynuclear compounds.—G. D. Searle & Co. Dec. 15 1947. 646,048.

Dehydration of aqueous solutions of formic acid.—Usines De Melle. Dec. 31 1947. 646,219.

Production of arecoline.—Nopco Chemical Co. Jan. 12 1948. 646,220.

Preparation of dehydrated castor-oil.—L. Beyer & Sons, Ltd. Jan. 14 1948. 646,049.

Treated soya-bean oil and method of treating same to produce drying characteristics therein.—Harvel Research Corporation. Jan. 20 1948. 646,076.

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Adhesive compositions.—B.B. Chemical Co., Ltd., W. H. Swire, and A. Hardy. Feb. 5 1949. 646,079.

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Arc-welding electrodes.—Mond Nickel Co., Ltd. Feb. 25 1948. 645,958.

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Process for isolation of cholesterol from wool wax alcohols.—Organon Laboratories, Ltd., and C. L. Hewett. Feb. 28 1949. 646,227.

Transparent metal fabricating lubricant.—Standard Oil Development Co. March 9 1948. 646,187.

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Devices for continuous purification by means of dialysis of liquids containing impurities of colloidal nature.—N.V. Onderzoekingsinstituut Research. April 30 1948. 646,238.

Pigments of the oxazines series.—I.C.I., Ltd., and R. W. G. Preston. May 11 1949. 646,099.

Manufacture of organic oxidation products.—Distillers Co., Ltd., E. G. E. Hawkins, D. C. Quin, and F. E. Salt. May 18 1949. 646,102.

Trithioacetals.—Ilford, Ltd., F. P. Doyle, and J. D. Kendall. May 11 1949. 645,965.

Dyestuff intermediates.—Ilford, Ltd., F. P. Doyle, and J. D. Kendall. May 11 1949. 645,966.

Cyanine dyestuffs.—Ilford, Ltd., F. P. Doyle, and J. D. Kendall. May 11 1949. 645,967.

Symmetrical dicarbocyanine dyestuffs and sensitising photographic emulsions.—Ilford, Ltd., F. P. Doyle, and J. D. Kendall. May 11 1949. 645,968.

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Coal carbonisation and gasification.—Hydrocarbon Research, Inc. June 7 1948. 646,105.

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Disinfectant and deodorant compositions.—Continax, Ltd., North Western Laboratories, Ltd., and S. King. July 26 1949. 645,976.

Roasting zinc ore.—W. W. Triggs. (Dorr Co.). July 30 1948. 645,977.

Preparation and purification of antibiotics.—Wellcome Foundation, Ltd., and S. R. M. Bushby. Aug. 4 1949. 646,258.

Surface hardening of rail ends.—British Oxygen Co., Ltd. Aug. 5 1948. 646,259.

Stabilisers for photographic emulsions.—Ilford, Ltd., J. D. Kendall, and H. G. Suggate. Aug. 3 1949. 645,979.

Production of triazale derivatives.—Ilford, Ltd., J. D. Kendall, and H. G. Suggate. Aug. 3 1949. 645,980.

Process for the purification of xylenes by distillation.—I.C.I., Ltd., and G. H. Foxon. Aug. 10 1949. 646,116.

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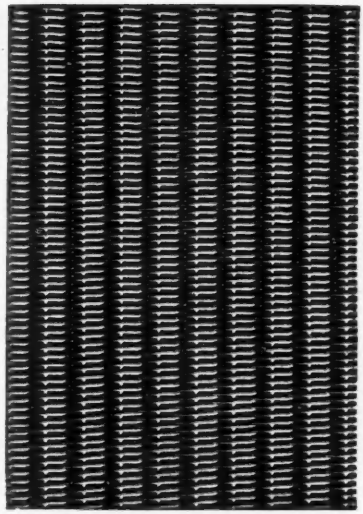

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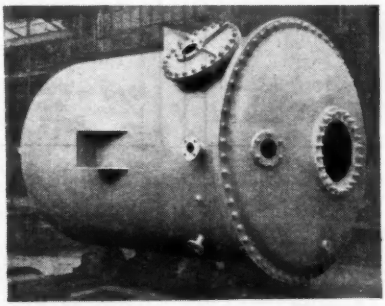

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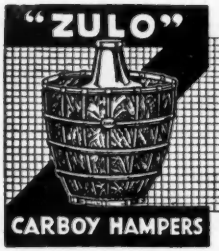

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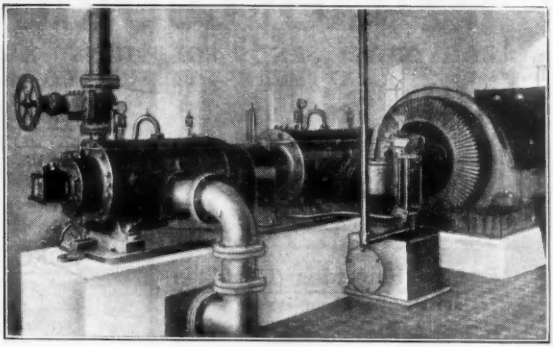

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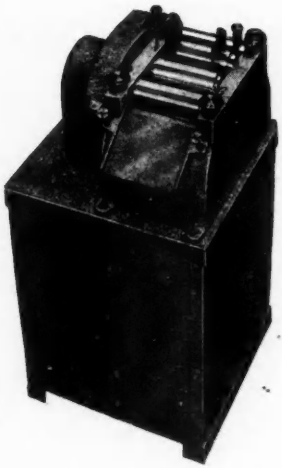

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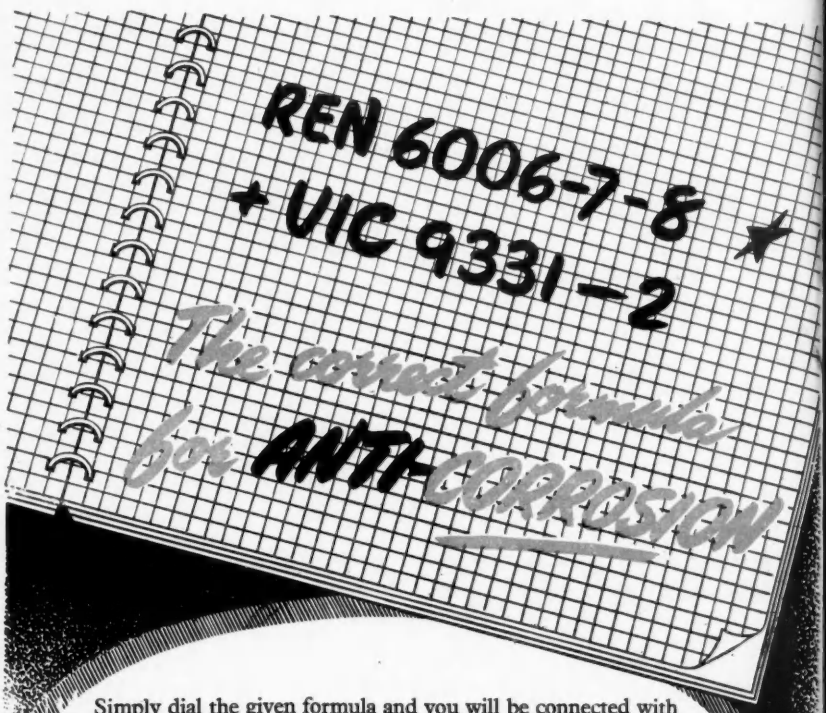

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